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PACKAGE engineering

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An engineering view of cushioning problems

The search for better cushioning materials to use as energy absorbers in connection with the militarily urgent aerial delivery program is bringing to light new data and experience. (See Page 7)

Use of extruded polyethylene containers

New filling and sealing machinery is developing, to use the European-developed extruded polyethylene containers on a production basis consistent with American ideas of line speeds. (See Page 14)

Package and product development go together

The time for the packaging engineer to start planning a new package is when the product itself is still "on paper"—to avoid minor product features contributing to inefficient packaging. (See Page 23)

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JUNE 1956

VOLUME 1 • NUMBER 6

consult

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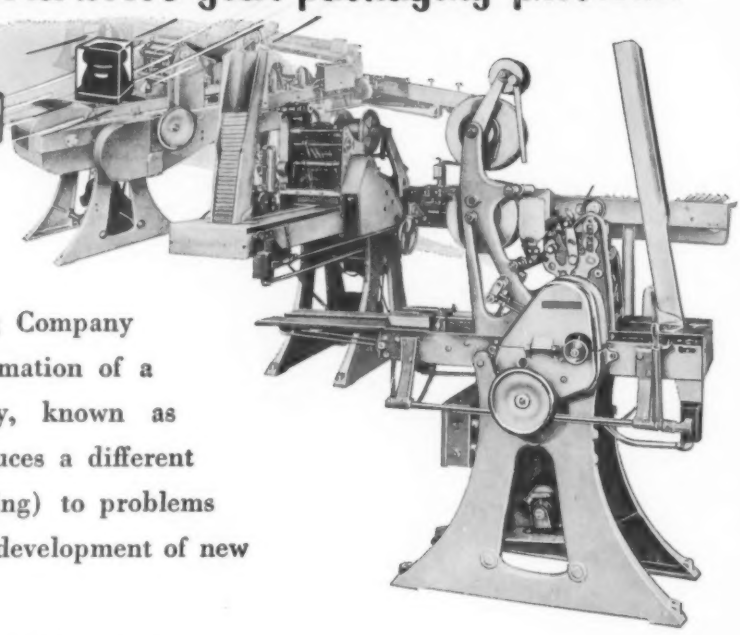

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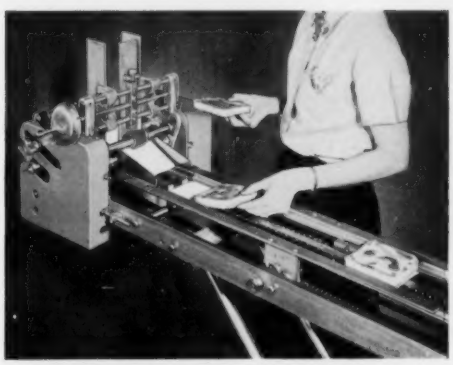

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Pliofilm, a rubber hydrochloride—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

A look ahead

As a plant gains experience with a packaging line over a period of months (and even years) many shortcuts and machinery modifications suggest themselves to enterprising production and engineering specialists. This is the situation at W. A. Sheaffer Pen Company, whose lines for the bottling of writing fluids use numerous refinements of equipment and methods. Our next issue will carry an article discussing some of the innovations on Sheaffer's line handling two-ounce bottles of writing fluids. The simplicity and effectiveness of a number of the shortcuts and techniques used on this line should interest anyone concerned with technical and in-plant operational packaging.

Problems of determining packaging costs for particular items continue to arise. In February, we carried an article reviewing some of the practices at Thompson Products. Now, we have another viewpoint on the topic of costs, as reflected in an article by John V. Christianson of Link Aviation, Incorporated. His article, soon to appear in Package Engineering, not only reviews his experience and that of his organization in determining packaging costs but also contains numerous practical, how-to-start suggestions.

An unusually significant article coming up is one by P. C. Booty, works manager of International Harvester Company's West Pullman works. During recent years the work of Mr. Booty and his organization in the packaging of bearings has been widely publicized. Now, for the first time, the engineering thinking behind this plant's mechanical bearing packaging operation is being told: In his forthcoming article, Mr. Booty traces the practical development of the main idea, showing step-by-step how the basic packaging machinery came to be.

—R. B. H.

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PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

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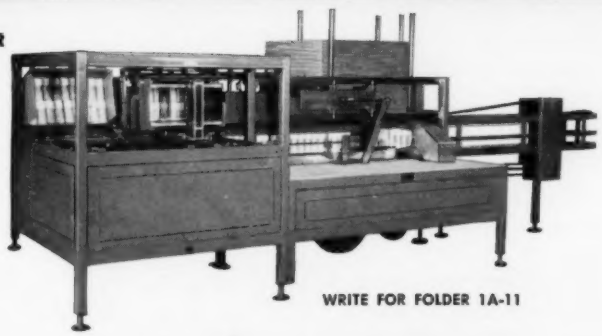

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A note from the Publisher

A business magazine, such as PACKAGE ENGINEERING, has a two-fold job to do for its readers. The first and most important job is to present an editorial content of interest to our particular audience. A glance at the table of contents of this and preceding issues will show a wide variety of subjects covered, and all covered from the package engineering viewpoint. Some of the ablest men in the packaging field have authored articles for us.

Our second responsibility to our readers is to provide sources of supply for the various products used in the packaging operation. This responsibility is extremely important in the field we serve, as our readers are charged with the responsibility of selecting the right package or packaging material to do a particular packaging job and the buying and specifying of the equipment necessary to operate the packaging line once the package has been determined.

Any doubt as to the range of our readers' interest to find the answers to various problems of procurement would be dispelled by going over our mail. In the first three months of this year, over 8,000 requests for more information were turned over to advertisers or to suppliers who had listings in our industry literature or our product announcements sections.

In addition, we have had innumerable requests from readers for sources of supply on items not advertised.

These requests were for information on a wide variety of products. Some requests for information have been routine, while others have involved considerable digging around to find out exactly what was wanted. All get answered, but occasionally they take a little time, as answers have turned up in a variety of places . . . . one at the folding box convention in San Francisco, and another at the packaging show in Atlantic City, for instance.

A few typical requests were for information on packaging draperies, who makes a semi-automatic capper, where to buy a check weigher, a source for resealable polyethylene bags, a source for elasticized bands for a set-up box, paper applicators, expendable pallets, polyethylene closures, case sealing adhesives, and many others.

Our advertising volume is building steadily, and with each issue we will furnish you with a larger group of suppliers in the field. However, if you don't see what you are looking for in the advertising pages of PACKAGE ENGINEERING, we hope you will continue to write to us and we will do our best to find the information you are looking for. To date the one request that stumped us was from a manufacturer who wanted some information on setting up a line to wrap and package shingles. If any supplier who is reading this has the answer, and will write us, we will be very happy to put him in touch with the company with this particular problem.

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Publisher

R. Bruce Holmgren
Editor

Laurence V. Burton
Consulting Editor

Irwin F. Megargee
Eastern Manager

Anne Bernhard
Business Manager

Burton Cherry
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Executive and editorial offices:
1791 West Howard Street,
Chicago 26, Illinois
Telephone: Briargate 4-7837

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In delving into the properties of cushioning materials as a phase of research for the government's aerial delivery program, its engineers and technologists are coming up with a lot of new information—worthy of close study by all packaging specialists. While the extreme cushioning required for aerial delivery represents a far cry from the cushioning needs of normal, commercial packaging, the engineering knowledge gained from the military research represents a major contribution to the forward thinking of the packaging field in general.

Edward F. Williams is a graduate of Lehigh University with a B. S. degree in chemical engineering. He has been associated with the QM Food and Container Institute since 1953, when he assumed his present position. Prior to that time he was chief chemist and chief of test planning division, Philadelphia Quartermaster Laboratories.

Cushioning for high velocity impacts

By Edward F. Williams,
Chief, Methods, Standards, and Evaluation Branch, Container Laboratories, Quartermaster Food and Container Institute for the Armed Forces, Chicago

In design of systems for delivery of supplies and equipment by airdrop from aircraft traveling at 150 miles an hour at altitudes from 700 feet up, the package engineer is faced with complications. Especially when cost studies (1) indicate that for maximum economy he must incorporate adequate protection so that the item will survive a vertical impact velocity equivalent to a free fall of 60 to 150 feet (40 to 100 miles per hour) and an unknown horizontal velocity.

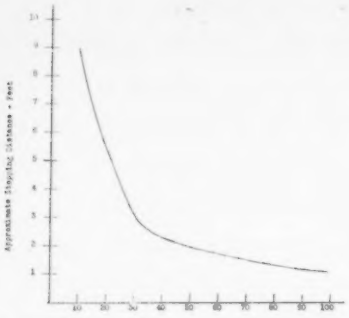
At first glance, this may seem to be an impossible problem. Visualizing an automobile subjected to an uncontrolled deceleration from 40 miles an hour to zero in the short space of time in which a collision occurs, it can be readily realized that the resulting wreckage would not have occurred if the stopping distance had been, let us say, five feet instead of one or two feet.

This is the key to controlled impact: Stopping distance combined with uniform deceleration. In a vehicle, this is accomplished by the friction of the brake bands against the drum. In an airdrop design it must be accomplished by *cushioning*. The relationship between stopping distance and deceleration is illustrated in Figure 1.

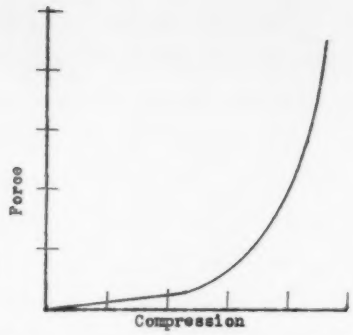
Choice Of Cushioning

Conventional cushioning such as foam rubber, cellulose wadding, and, in general, materials having a stress strain curve similar to Figure 2, do not exhibit uniform deceleration; therefore, materials which have a stress strain curve similar to Figure 3 must be used. The flat portion of the curve indicates that the cushion exerts a constant force as it is compressed. Since force is directly related to acceleration (force = mass × acceleration) the material will also give uniform or constant deceleration during impact.

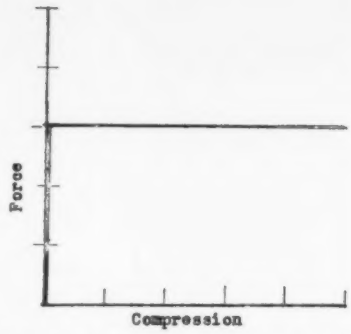
Thus, it is necessary to choose a



1. Stopping distance vs. deceleration at impact velocity of 50 miles per hour.



2. Force compression curve of conventional type of cushion used.



3. Force compression curve of ideal cushion.

material which will limit the force level to that of the item to be delivered, and to provide sufficient material to stop the item without departing from the flat portion of the curve, since this would increase the force applied to the item. This can be likened to decelerating an automobile by application of the brakes to stop the car. If the brakes are applied too rapidly, the stopping distance is too short and the allowable force is exceeded.

This results in damage to the cargo — the passengers. If the stopping distance is adequate, the allowable forces are not exceeded and a gentle rocking is experienced. This example of uniform deceleration and stopping distance is advanced to illustrate that the approaches utilized are not new, radically different, or beyond comprehension.

The term "cushion" as used in this article has been loosely applied up to this point. Examples of cushions with curves resembling Figure 3 are honeycomb materials, cans, and foamed plastics. These are not normally considered cushions, but at high impact velocities they absorb considerable energy. To differentiate materials with curves of this type from conventional cushions, the nomenclature, "energy absorbers", has been used.

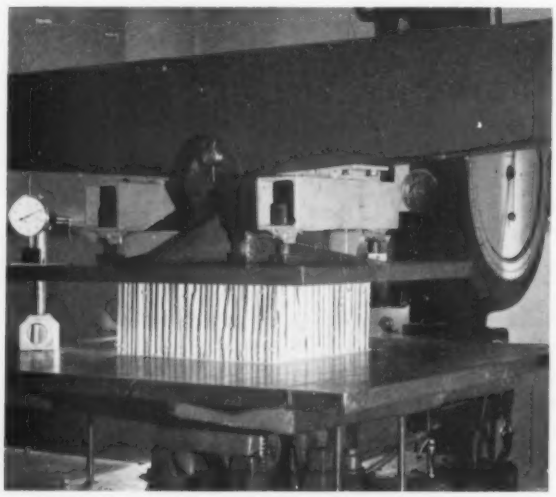
Search For Dynamic Data

One of the problems encountered was that data obtained from compressing the material in a press type testing machine (Figure 4) could not be used to predict the dynamic behavior of the material at impact velocities encountered in airdrop designs. Tests using higher velocities and electronic instrumentation (Figure 5) indicated that approximately twice as much force is exerted by the energy absorber under dynamic conditions than can be predicted from the static data. This, in turn, means that the energy absorbing capacity is also doubled under dynamic conditions.

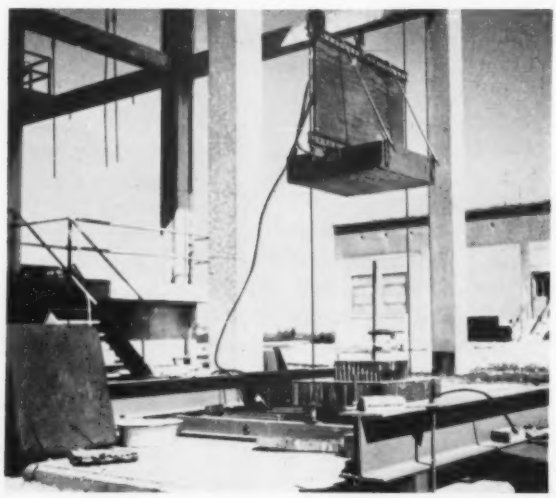
An adequate explanation of this phenomenon has not yet been advanced. Without doubt, friction and viscous damping play a major part. It has been observed that during compression testing under static conditions where the force compression curve on release of the load follows the loading curve, dynamic and static properties are virtually identical.

Where the unloading curve exhib-

4. Static test of paper honeycomb.



5. Drop facility at University of Texas. Falling weight tests honeycomb under dynamic conditions.



its hysterisis, the dynamic properties differ from the static by a factor which appears to be proportional to the area between the loading and the unloading curves. Theoretical studies are under way to permit prediction of dynamic behavior from the static stress strain curves utilizing analog computer techniques.

Theoretical analyses indicated that a wire in tension or a cylindrical column in compression could absorb energy when stressed beyond the elastic limit of the material. From this study, compression of columns progressed to laboratory testing. Paperboard mailing tubes, beer cans, aluminum cups, and honeycomb materials all exhibited the desired curve shape.

Emphasis was placed on paper honeycomb (Figure 6) because of the high energy absorbing capacity and because it could be obtained in the unexpanded form, shipped to destination, and expanded—and facings applied in the staging area. With the unexpanded material, shipping rates are comparable to paper. One carload of such unexpanded material can be fabricated into 20 carloads of the material as used.

Paper Honeycomb Applications

Properties of several types of honeycomb are incorporated in Table 1 and Figure 7. In crushing, a short duration peak is passed, then the cell walls fold transversely to the column, forming accordion-like pleats. This action continues in increments or folds until no material remains uncrushed, after which the folds are creased more firmly and then the material is compressed. The usable portion of the curve amounts to approximately 80 per cent of the original honeycomb thickness.

Two airdrop systems have been developed using paper honeycomb. One system delivers 48 cases of combat rations (Figure 8) at a terminal velocity of approximately 50 miles per hour using a 24-foot ribbon parachute and approximately 25 cubic feet of honeycomb, replacing a 64-foot full canopy parachute. Resultant savings amount to about eight dollars a case. The other system delivers four 55-gallon drums (Figure 9) at about the same velocity, using the same type of parachute and honeycomb. Net savings on this system amount to about two dollars per gallon.

In experimenting with methods of attaining specific airdrop terminal velocities, a design requiring no parachute was arrived at. This, as illustrated in Figure 10, consists of a thickness of honeycomb, a case of rations, and a fiberboard sleeve of such dimension that the center of gravity is displaced by four inches and more from the geometric center of the sleeve.

In flight, this design behaves similarly to a dart. Terminal velocities as high as 70 miles an hour have been attained, yet the rations have survived without a dented can. This design is of interest to the military because of the necessity of foxhole-to-foxhole delivery. The containers are designed to nest within each other to conserve aircraft space.

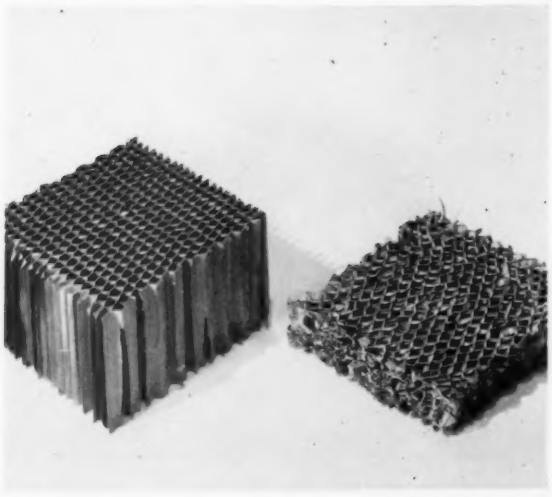
They are normally deployed from the plane in units of six. The banding is cut about 50 feet from the plane and the containers separate and fall as individual cases. One case will provide six personnel with three meals for one day or one person three meals per day for six days.

As illustrated in Figure 11, honeycomb can be used to deliver a ¼-ton utility truck (jeep) by air using a 64-foot parachute (cost — $580) instead of the 100-foot parachute (cost — $1200) now used. This design was tested by free falling the truck from 25 feet at a resultant velocity of approximately 25 miles an hour. The thickness shown can be safely reduced by 12 inches.

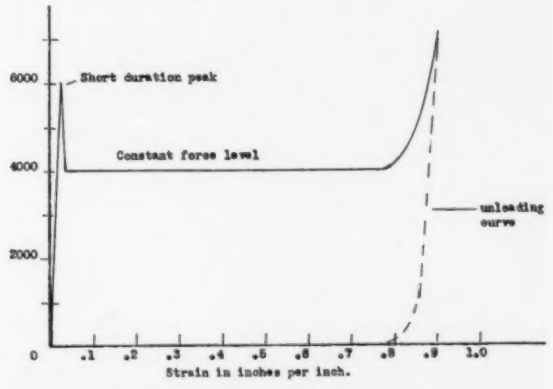
Foamed And Expanded Plastics

Another structure under investigation is the sphere as found in foamed and expanded plastics. The ideal foamed plastic would be one that could be dropped with the foaming components in the liquid state, foaming and setting being accomplished

6. Paper honeycomb before and after crushing.



7. Static properties of paper honeycomb. Cell size is 7/16-inch, using 70-pound kraft paper.



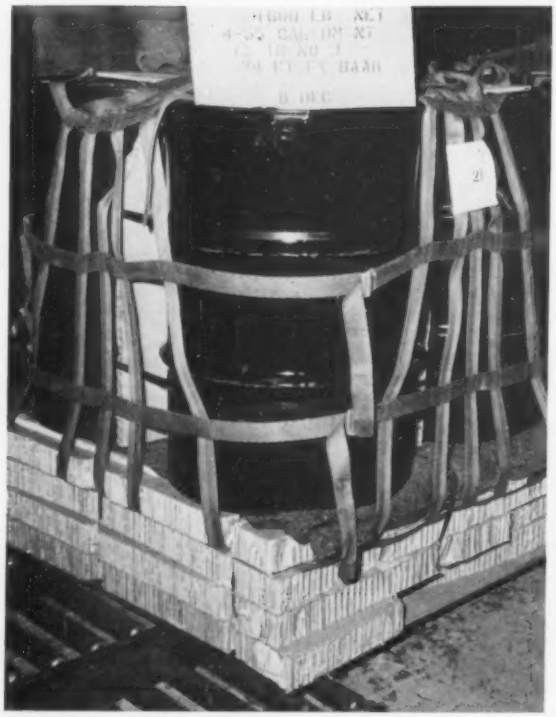
8. A one-ton load of C rations prepared for drop.

while the drop system is falling. Since, at the drop velocities now being encountered, the time for mixing, foaming, and setting is limited to a total of 20 seconds, the ideal appears to be far in the future.

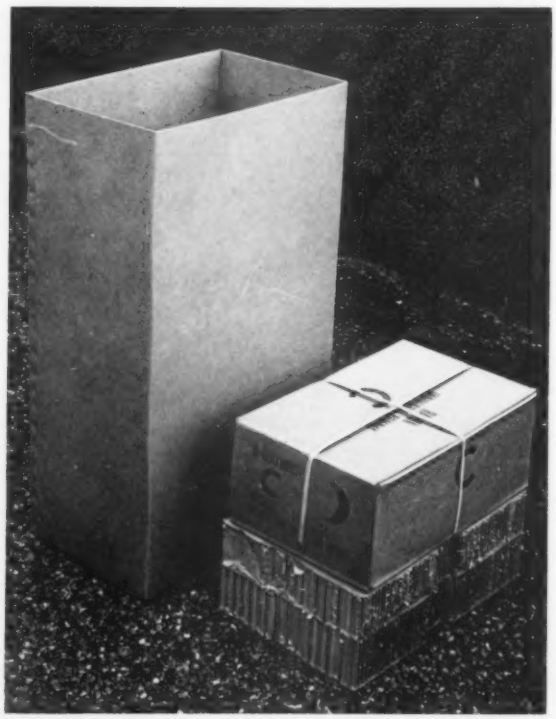
Foamed and expanded plastics exhibit a curve which resembles a composite of curves shown in Figures 2 and 3. There is no flat portion of the curve, as shown in Figure 12. This general form is typical of both expanded and foamed plastics. Complete dynamic information is not presently available.

Non-Aerial Cushioning

To the average man with a packaging problem, this research is interesting but does not appear immediately useful. One or two points remain to be made. After honeycomb is compressed and the cell walls folded, the curve resembles that of a conventional cushion (Figure 2). Additionally, the peak force mentioned briefly before is of vital concern to the designer who needs lightweight blocking or bracing. By partially crushing a piece of honeycomb it is pos-

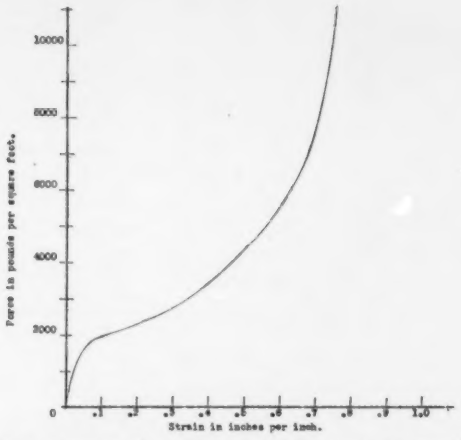


9. Airdrop design for four 55-gallon drums.



10. Airdrop design for one can of combat rations.

11. Airdrop design for one-quarter ton truck.



12. Static properties of polystyrene. Density equals 2.0 pounds per cubic foot, using this material.

sible to obtain blocking, bracing, and cushioning in one material.

One application of crushed honeycomb is a proposed overpack of a domestic vinegar domestic pack to make the domestic pack suitable for overseas shipment without repacking the individual bottles (Figure 13).

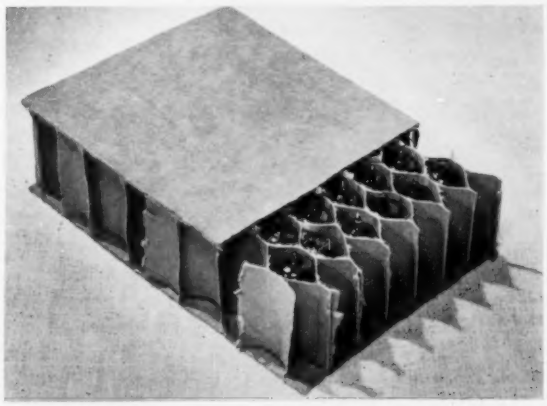
The high static strength of honeycomb may be utilized to support awkward items. For example, during repair to an airplane at Blackstone, Virginia, honeycomb was used as a "stand" for a radial engine while exchanging engines on the plane. The honeycomb was crushed by the fuel lines, ignition tubes, and cylinders until sufficient load-bearing area was formed to support the weight of the engine.

While the design pictured in Figure 14 is merely a suggested application and can in no way be construed to be an official method of packaging vacuum tubes, it does show one application for packaging fragile items. If additional protection is desired, every other call may be utilized. This method has proved satisfactory for shipment of bacteriological culture tubes in comparatively thin-walled glass tubes.

Further details are available in report form from the Quartermaster Food and Container Institute for the Armed Forces, 1819 West Pershing Road, Chicago 9, Illinois.

(1) "Cushioning for Airdrop, Part II, "University of Texas, Austin, Texas, 19 December 1955 (Contract DA 19-129-QM-150).

13. Use of crushed honeycomb as cushion in adapting domestic vinegar pack for overseas shipment.



14. Suggested use of cell structures for packaging items. Cell sizes up to two inches available.

Table 1.—Properties of Paper Honeycomb.

Cell size	Basis weight of paper honeycomb	Static		Dynamic (approximate)	
		Peak force	Constant force	Peak force	Constant force
inches	pounds	lbs/per sq. ft		lbs. per square foot	
7/16	70	7056	4608	16200	8200
¾	99	6526	3744	10500	6000
¾	70	4320	2160	6800	4000
1	70	2448	1008	3700	2800

Edmund H. Eitel received his M.E. degree from Cornell University and his M.A. degree from Harvard University. After long experience in general sales management he became a personnel consultant. For many years he was associated with Booz, Allen & Hamilton, a management counseling firm, as personnel consultant for the selection of executive and technical personnel. In 1951 he moved to Virginia. He is now a consultant to a number of companies in the Southeast.

Here is an ingenious solution to the problem of getting expert packaging personnel for a limited amount of money. Mr. Eitel's experience (and that of his client, a manufacturing company) in combining the services of a consultant with the education and development of a young engineer, to have the guidance of the consultant and the fulltime service of the engineer, may suggest similar solutions to those facing the same problem.

Finding and developing a new packaging engineer

by Edmund H. Eitel,
Management and Personnel Consultant, Halifax, Virginia

Taking a young engineer, sending him to a school that provides special work in packaging, and making periodic use of a recognized packaging consultant — all these represent the solution found by one company to solve the problem of replacing a skilled packaging engineer who had retired.

The interesting point of this solution is that by combining the development of a man employed by the company, with the use of an outside consultant, the chief engineer of the company is able to have a fulltime packaging engineer and the intermittent services of a consultant — without exceeding the amount which the company's salary committee was able to allot to the position of the packaging engineer.

My client is a manufacturer of small metal products — all of which have to be packaged in an automatic operation. The large volume of production not only entails a high speed requirement but also gives rise to a cost factor in automatic packaging that is comparable to the cost of the steel itself or to the cost of heat treating, sharpening and grinding operations.

Initial Specifications

The way in which the job specifications developed for a position the company expected to fill is an interesting evolution. Starting point was the man who was retiring. He was a practical and resourceful person who had grown up with the job; he developed and expanded his knowledge and experience as the company's packaging operation itself grew.

However, in an effort to have some specifications to start with, the chief engineer and his staff came up with this definition:

"Requirements: Knowledge and familiarity with current packaging methods and techniques; knowledge of equipment permitting wide diversification and various types of packages; knowledge of design and testing of packaging materials; education equivalent to four years of college, M.E. or I.E. degree, and age 30 to 40 years."

The engineers explained that they considered necessary four to seven years of experience in the techniques of package engineering, including materials and the setting of standards, as well as thorough experience in packaging machinery and in establishing the most economical methods of packaging. At this initial stage the company expected to obtain such a man at a salary of six to seven thousand dollars a year.

Analyzing The Requirements

My next step is one that is familiar to those who have been through the mill and will be of interest to those who have yet to face the problem. We had to examine and refine the specifications, to determine just what to emphasize. For example, what fields or areas should predominate?

Should the man know packaging design? Should he know the manufacture of a product? How much

should he know about cost problems? How about the design of machinery? In seeking answers to these and similar questions, the engineers revised their statement of the job specifications, coming up with the following:

Revised "Specs"

"A man with a degree in mechanical or industrial engineering; four to five years experience in packaging; an ability to translate the in-store requirements of packaging at the point of purchase, back through the design board and into the production line; should know modern automatic packaging details, including costs; should have the ability to design a package for a specific product including small cartons, cellophane usage, paper wrappings, display cards, merchandising displays and shipping containers, together with specifications of materials for these items, and should be able to make detailed drawings involved."

Wide Salary Differences

As we proceeded with our search for candidates for this position, we found a major gap between what the company expected to pay the man filling this position and what the candidates or applicants expected to receive. Making full use of the various sources open to a personnel consultant, we located around 100 packaging engineers of varying grades and experience.

One of our first replies was from a man earning $22,000 a year. Our next reply came from a man so valuable to a manufacturer of cartons, board and other packaging components that he was earning $32,000 a year. For men having the expert knowledge and keen imagination, along with familiarity of the latest packaging developments, salaries ranged from $12,000 to $25,000 a year.

We found several borderline possibilities among men earning around $11,000, but there always seemed to be some lack in the men whose annual salaries were less than $12,000 a year. However, all of these figures ranged far beyond what the company salary committee had established as the salary of the packaging engineer.

We, along with the company engineers, came up with the idea of combining the services of a consultant with the training and development of a man within the company as a packaging engineer. How this came about was that a brilliant consultant somehow got into the search picture, and he would have taken the job for $20,000 a year. Although our client could not pay this kind of a salary, there did appear to be a real need for what this man had to offer.

Viewpoint Important

He had breadth of view, knowledge of packaging and merchandising, and acquaintance with the latest developments in machinery and equipment, including electronic controls. The thought came to all of us involved in the project that the company should use his services from time to time.

Coupled with this came the idea of taking a qualified young engineer and developing him as a packaging engineer. This plan involves sending the man to a school where packaging courses are available. As a background, this man had the advantage of having worked under the able engineer who had retired. His school work would prepare him to meet the exacting requirements of package engineering as we now know it.

Giving It Direction

The chief engineer will control the entire program for the company and the packaging engineer will work under his direction. The consultant will provide general guidance to the program of packaging development. Working through the chief engineer, he will guide the activity of the packaging engineer.

Thus, through promotion of a younger man and through periodic use of a consultant the chief engineer is getting the fulltime services of a packaging engineer and the parttime services of a competent consultant — all without substantially exceeding the salary originally established for the position of packaging engineer.

Our experience in solving this problem, especially in regard to the divergent views on salary requirements, shows what is happening in fields involving rapid technological developments: In maintaining a given salary, based on "practical" prices, the company found itself on new ground —faced with an activity whose personnel need skills and knowledge that are skyrocketing in progress with automation and similar fast-moving techniques and ideas.

However, the company recognized its need for the guidance of a man with expert, current knowledge, and by using him as a consultant, it will give real help to the chief engineer, whose overall responsibilities do not permit him to specialize in packaging as such. Further, the consultant will prove of genuine help to the young man being promoted and trained as a packaging engineer.

Editor's Note

One of the dominant questions in the field of packaging today is that of managing the packaging function — organizing the structural and functional relationships for top effectiveness in this field. All this focuses attention on the basic problem of the qualifications of men: What education and experience does a packaging expert need? How does he fit into the company organization? How does he determine the tasks and responsibilities, and hence the background requirements of those working under him? These and countless other questions are taking on increasing importance. We welcome the comments and opinions of our readers on this topic.

R. B. H.

Filling and sealing extruded polyethylene containers

By Laurence V. Burton,
Consulting Editor, Package Engineering

Successful transplantation of a European packaging concept into the American production scene frequently depends on development of suitable machinery. Such is the case with the extruded polyethylene tubes and bottles, now made by Bradley Container Corporation. In this two-part article (the second part of which will appear in our July issue) Dr. Burton not only traces the development of machinery to fill and seal these new containers, but also reviews some practical operating procedures for use with them.

When a new type of polyethylene container, made the Tuboplast extrusion method by Bradley Container Corporation, came on the American market in 1954, the only machines available for filling and sealing this type of container were of European make. These machines were slow compared to American ideas. Furthermore, the sealing of the polyethylene containers in European machines was accomplished by exposing the polyethylene to open gas flames. In order that these new containers could be competitive in the American market, or even acceptable to American industrial users, new machines made to American standards of productivity and efficiency were necessary. This was true despite the successful introduction of these containers in Europe some two years previously.

Where could such new machines be obtained? Bradley's engineering department called on many packaging machinery manufacturers to produce machines that would fill and seal the Bracon tubes and bottles, but they were slow to pick up the idea that the new containers would create a new market for packaging machines.

The techniques of heat sealing thin gauges of polyethylene film have been highly developed in this country but, for thicker gauges (0.012 to 0.040 inch), such as are found in the Bracon tubes and bottles, slightly different methods need to be incorporated. This arises from the need to adapt all operations of sealing to the time-temperature factors involved, and may have appeared unnecessarily difficult to some of the machine builders.

Two firms with experience in the special machinery field had the vision and saw the opportunity to enlarge the scope of their businesses: Carbert Manufacturing Company and the A & M Tool & Die Company. Horix Manufacturing Co., already in the packaging field, also saw the opportunity, and came up with its own design.

Why were new machines needed? That's a logical question and the answer is simple. The Bracon tubes and bottles of extruded polyethylene need to be sealed in a special way and in a manner that will incorporate American ideas of proper and adequate productivity as well as safety. The need for special sealing equipment originates in the peculiar char-

acteristics of polyethylene which permit it to form a hot weld much in the manner of a fusion weld to join two pieces of steel.

Polyethylene Welding, Sealing

When two pieces of polyethylene are in contact and heated by radiant heat to the melting point of the material, they will melt to form a bead. If this molten bead is pressed together, a fusion weld takes place. As soon as the weld is cold it has the strength of the adjacent material.

The pressure must be made by cold metal, for hot metal will stick to molten polyethylene. For this reason, all of the machines for sealing Bracon tubes use water-cooled crimping jaws, although the patting device for pressing the molten edge of Bracon bottles and bottom disk during sealing is usually air cooled.

Tube Sealing

Extruded polyethylene tubes resemble collapsible metal tubes in appearance when received from their manufacturer, and like the latter are filled at the open end. Then, instead of mechanical crimping as is customarily done with metal tubes, the material at the open end is welded together.

After filling through the bottom of the tube held upright in a holder with about one inch exposed (See Figure 2), clamping jaws grip the tube and flatten it, leaving only 1/8 inch of the extreme end of the tube extending beyond the jaws. This 1/8-inch portion is then exposed to radiant heat for a time sufficient to melt it to a bead that rests on the clamping jaws.

Still in the jaws, the tube is removed from the heating position and, while the bead is still molten, it is then momentarily pinched by water-cooled sealing jaws, to effect the fusion weld or seal. The sealed end of the tube, still held by the clamping jaws, is now cooled by gentle jets of compressed air; and the job is done.

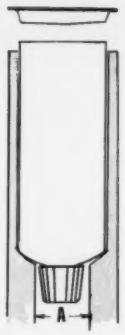
Characteristics of the machines presently available to carry out the foregoing operation will be described later under the various types of machines.

Bottle Sealing

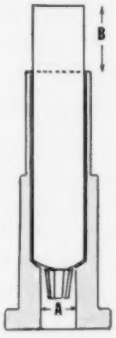
Extruded polyethylene bottles, like the extruded tubes, are made for bottom filling and subsequent adding of the bottom by sealing onto it a molded polyethylene disk made to fit the particular bottle. The empty bottles are held upside down in an adjustable holder or sleeve for filling and sealing. (See Figure 1). Each holder has been adjusted to expose 1/8 of an inch of the open end above the metal holder.

After filling, an operator places a bottom disk of molded polyethylene on the open end. Next, the edge of the exposed portion of the bottle in its holder, together with the bottom disk, is subjected to radiant heat to melt the end of the bottle and the edge of the bottom disk. To insure uniformity of melting, the bottle and its holder are rotated on its vertical axis in close proximity to the source of radiant heat.

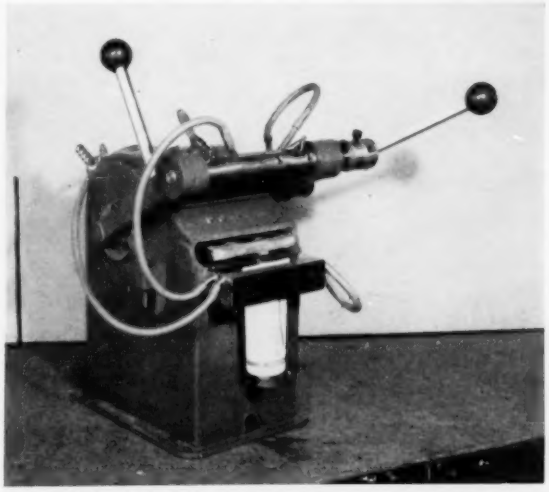
The molten bead, formed in a circle in the foregoing manner, rests on the edge of the bottle holder where it is next pressed by cold metal to form the fusion weld in an operation called "patting". Here a circular metal plate about ½ inch larger than the diameter of the container, known as a patter, presses the molten material together. After mo-



1. Empty bottle in holder, showing molded polyethylene disk ready to be positioned prior to heat sealing.



2. Empty tube in holder. About 1⅛ inches dimension **b**) exposed. Clamping jaws cover one inch, leaving ⅛ inch for heat sealing. Dimension **a** must admit the tube-cap without binding, for in this operation the tube must rest on its shoulder.



3. Laboratory model for tube sealing, showing ⅛ inch of tube exposed above the water-cooled clamping jaws. Except for the absence of a tube holder, this apparatus embodies the same principles of sealing found in production machines.

Type of Machine	For Sealing	Production Rate per Min.	Available from
Laboratory	Tubes	2	Bradley Container Corp.
Semi-Automatic	Tubes	15-20	Carbert Manufacturing Co.
Semi-Automatic	Tubes	15-60	Carbert Manufacturing Co.
Automatic	Tubes	60	Carbert Manufacturing Co.
Automatic	Tubes	20-80 single fill	A & M Tool & Die Co.
Automatic	Tubes	40-120 double fill	A & M Tool & Die Co.
Automatic	Tubes	20-30	Haring Equipment Corp. (Kalix-Dupuy Machine)
Laboratory	Bottles	2	Bradley Container Corp.
Semi-Automatic	Bottles	20-30	Carbert Manufacturing Co.
Automatic	Bottles	40	Carbert Manufacturing Co.
Automatic	Bottles	120-180	Horix Manufacturing Co.

mentary cooling by small jets of compressed air, the weld is complete and is as strong as the adjacent materials.

AVAILABLE MACHINES

To embody and mechanize the foregoing principles of sealing extruded tubes and bottles, quite a variety of machines are currently available. They range from strictly laboratory models through semi-automatic to fully automatic machines; from inexpensive to medium-priced and higher-priced; from production rates as low as two per minute for laboratory tests to as high as 180 per minute for large-scale production.

In the short space of about 18 months, these various types of machines have been installed in plants from coast to coast. As of March 1, 1956, 32 plants in this country and Canada had installed them. Some plants have only one machine while others have several types.

A considerable number of contract packagers are equipped to handle extruded containers so that any prospective user is now able to get his product filled and sealed for market tests without any initial outlay for machinery. Distribution of these machines is tabulated below:

Contract Packagers	13 plants
Privately Owned	19 plants
Total as of March 1, 1956	32 plants

Classified by types and makes of sealing machines, the accompanying tabulation is helpful:

A brief review of the principal characteristics of each of these machines follows. In this description the equipment for sealing tubes will be described separately from the equipment for sealing bottles.

TUBE SEALING EQUIPMENT

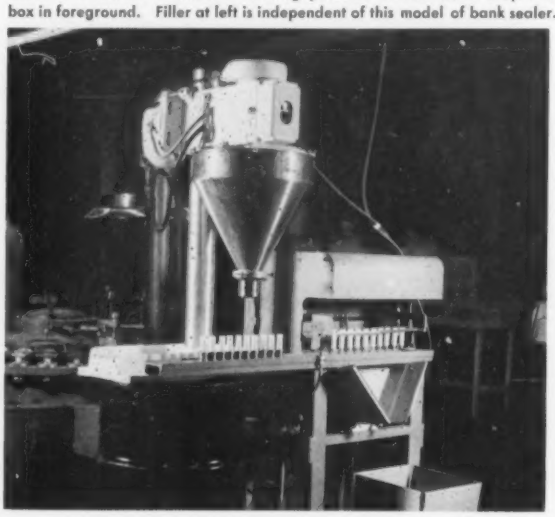
Laboratory Tube Sealer

A simple hand-operated tube sealer is shown in Figure 3. The filled tube without a receptacle or tube-holder is clamped in a water-cooled clamping jaw in a position that leaves 1/8 inch of the tube exposed above the jaws. By pulling down the left-hand lever shown in the illustration, the heating unit is pushed out to a position directly above the exposed end of the tube. After the molten bead is formed by melting the polyethylene by radiant heat, the lever is returned and the right-hand lever is pulled down to bring the crimping jaws into play.

Production Equipment
Bank Sealer for Tubes

Carbert Manufacturing Company, Inc., a newcomer to this type of packaging machinery, has developed both semi-automatic and fully automatic machines for sealing both tubes and bottles, but does not attempt to produce filling machines. This company features the term "Bank Seal" for its machines because

4. Carbert bank sealer (right) with bank of ten filled tubes clamped and lifted from holders to the heat sealing position. Sealed tubes drop into box in foreground. Filler at left is independent of this model of bank sealer.



5. Saga 11-station sealer and Bartelt auger-type filler.

they seal a bank or gang of containers at a time. This line of machines is the lowest cost of the production machines.

The simplest Carbert machine takes filled tubes in holders fastened in a line in a movable metal rack as shown in Figure 4. An operator on a separate machine fills a rackful of tubes while another operator on the bank sealer seals a rackful of tubes that have been previously filled. Two operators are required to fill and seal, but only one operator is actually using the bank sealer.

To accommodate the smaller sizes of tubes, inserts of varying size may be slipped into the holder. And the inserts may be adjusted up or down to accommodate various tube lengths. The tube sealers made by Carbert are made with varying degrees of automation from the simplest—where the operator slides the rack to the proper place on the table, pushes a large handle on the left to clamp the tubes in the clamping jaws, and then trips a valve — to a completely automatic machine.

In the simple machine, the tripping of the air valve starts a sequence of events that embody the principles of sealing already described, except that they are done simultaneously on ten containers instead of successively. Thus the exposed ends of the ten tubes in a rack are elevated by the clamping mechanism to the heater, heated, then crimped, cooled, and dropped onto a conveyor or into a box. Then a fresh rack of tubes is started on another cycle.

Sealing rates of 15 to 20 per minute are obtained with one operator. This operator does only sealing. Filling and inspecting are done by other operators. Tube diameters accommodated in the bank sealer made by Carbert range from 11 to 60 mm and tube heights range from two to 11 inches.

In a more automatic model of this machine the cycle starts automatically as soon as the rack or bank of tubes in their holders is slid manually into proper position and hits a stop. Production rate here is slightly higher, being 15 to 60 per minute, depending on the tube diameter.

A fully automatic combination filler and sealer is also offered by Carbert in which one operator can produce up to 60 filled and sealed tubes per minute.

The Saga Machines

The Saga machines, made in 11-station and 22-station models, are rotary machines with the tube-holders moving in a circular path about three to four feet in diameter by a Geneva or intermittent motion.

This line of machines is produced by a newcomer to the packaging machinery field, the A & M Tool & Die Company, Inc., and is available either with or without the filling heads. Saga machines are for tube sealing only — not for bottle sealing. The principal difference between the 11-station and 22-station models is the production rate and size. The 11-station machine uses single fill while the larger uses double fill. Both have the familiar diving nozzle. In one plant where I visited they were using a 22-station machine for single filling of a very heavy ointment by having both pistons connected to the single nozzle. (See Figures 6 and 7).

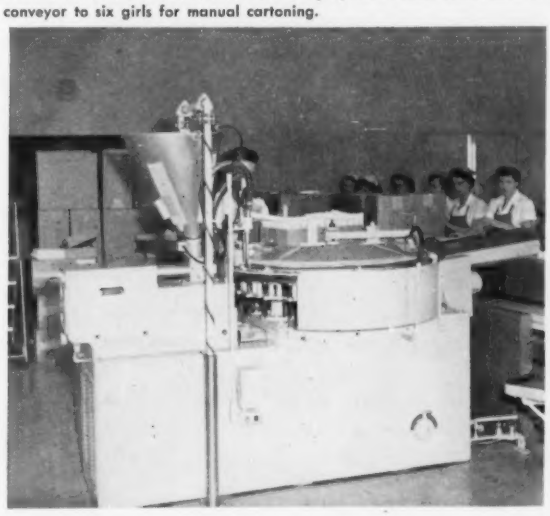
Tube sizes on the 11-station model range from 11 to 35 mm, and tube lengths from 1½ to seven inches. Speeds are from 20 to 40 on the larger size tubes and up to 80 per minute on smaller tubes. Volume capacity of tubes ranges from two cc to eight oz. One operator is required to insert the empty tubes into the holders, as shown in Figure 6. Since the holder is 0.006 inch larger than the tube, the operation is carried out easily.

As would be expected, the 22-station model has greater capacity, and takes tubes from 11 to 60 mm diameter and from 1½- to nine-inch lengths. Speeds range from 20 to 60 per minute (single fill) and 40 to 120 per minute (double fill). Volume capacities range from two cc to

(Continued on Page 38)

6. Saga 22-station tube filler and sealer. Operator inserts two empty tubes and turns them to proper position so that the front label parallels the seal. Spiral on infeed pipe and rectangular objects are electric heaters to keep product warm enough for easy filling.

7. Rear view of machine seen in Figure 6, showing flexible compressed air and cooling-water connections. Heating unit is located under the cover and behind the shield. Automatically ejected sealed tubes move on conveyor to six girls for manual cartoning.



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Milton J. Harnist is a graduate of St. Louis College of Pharmacy and the University of Michigan. His work has included, among other duties, some 33 years devoted to container inspection and specifications at the Brooklyn plant of E. R. Squibb & Sons. One of the pioneers of container specifications, Mr. Harnist has attended every annual conference of Packaging Institute and is a member of its glass containers committee.

How to measure a corrugated box correctly

By M. J. Harnist,
Product Release Section,
E. R. Squibb & Sons Division,
Olin Mathieson Chemical Corporation,
Brooklyn, New York

Here is a practical, down-to-earth approach to the problem of measuring a corrugated box, a topic that is currently receiving much attention and discussion in packaging circles. Well aware that different specialists of equal competence have more or less opposing views of how it should be done, Mr. Harnist offers his experience and ideas — to aid in crystalizing the experience of the field.

The multiplicity of box styles and the fact that corrugated box manufacturers combine different materials to manufacture three different sizes of board corrugations (A-, B- and C-flute), create hazards in measuring these boxes. Solid fibre cases also offer possibilities of errors of measurement. By using the method of measuring outlined here, only two ways of taking the size of the box are necessary. Both of them are essentially similar, and both are accurate.

NATURE OF PROBLEM: In the 1955 revision of Packaging Institute's "Glossary of Packaging Terms", it is stated that the manner of taking box measurements is a controversial subject. Box producers and users, different public and private agencies, and even individuals have proposed different methods. The method of measurement described herewith may advance the discussion to a terminal point. The author's experience extends back more than 30 years, and predates B-flute corrugated board. This experience dictates the method of measuring as described in this article. By describing this method, together with comparison to another method, we hope to aid in untangling the controversy.

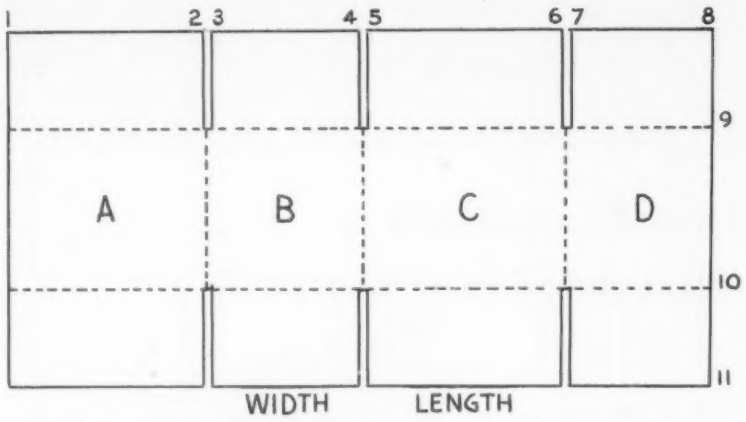
"Center-To-Center Of Scores"

THE METHOD: A frustrating experience for a container-inspector results unless, at the time of ordering, specifications have been laid down which follow the method of measuring from "*center-to-center of scores*" rather than by "inside dimensions". Actually, most combiners prefer to use "inside dimensions". But, by doing so they immediately create a problem for themselves and their customers.

The boxes delivered are apt to be of surprising dimensions so far as the items to be packed are concerned. If not of the correct size, the box could be un-usable, or require extra internal packing. Quite often, close inventory control, or perhaps a government order with a short delivery date, could create havoc should the boxes be rejected. The box must be made of proper size to easily pack and carry the intended contents. The length, width and height or depth must be stated.

Boxes made of A-flute must be of different dimensions than those made of B-flute or C-flute board. On the other hand, when "center-to-center of score" dimensions are specified, it is easy for the box manufacturer to set his scoring wheels at an exact measurement, and the inspector can then almost pin-point this measurement.

METHOD OF MEASURING: From the sketch in Figure 1, (inside of box) it can be seen that score lines for the length and width are centered at the vertical slots. This score is a single-line score. Normally, there are two parallel lines scored much lighter on the outside. (See Figure 2.) On the



1. This blank represents a regular slotted container prior to being formed or expanded. Top and bottom flaps are of equal length. The folded inner flaps meet only if the box itself is square.

scoring (horizontally) across the laid-out board as shown, these single line scores will control the height (from points 9 to 10). We are referring now to regular slotted cases.

Accurate Rules Necessary

To get a true measurement of a box as received from the box manufacturer, the tape must be cut and the box laid out flat, on a smooth level surface, the inside facing up. Pencil marks are then made in the middle of the score lines. (See Figure 2.) A box which is creased on a vertical corrugation close to the score line must not be marked on the crease, but rather on the score line itself.

A further precaution must be observed: Never take the measurement of the box panels which are taped together (the joint). The center panels directly opposite from the taped corner (panels B and C) must be used. By placing a steel ruler on the laid-out box, measurements accurate to 1/32″ or less can be made and readily duplicated. It is recommended that only steel rules made by a reputable manufacturer be used. This point may avoid a dispute between vendor and consumer, should one of them use a wooden ruler with the end corner worn off.

This manner of measuring can be used, not only on regular slotted boxes but on any other type, excepting full overlap cases, and includes solid fibreboard boxes. It can also be used on corrugated liners.

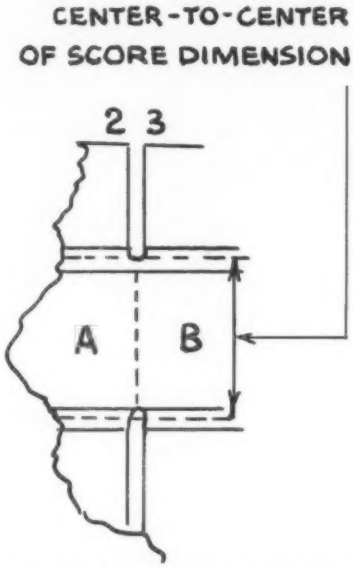
Use Of Fast Method

A quick way to measure boxes without stripping the tape, is to consider ¼″ as the width of the slot, then measure the length and width when the case is laying flat (as made). In nearly all boxes the slot is ¼″ wide. Any manufacturer may vary this, but by taking careful measurement, adjustments can be made. Any panel on which any part of the tape is applied *should not be measured.*

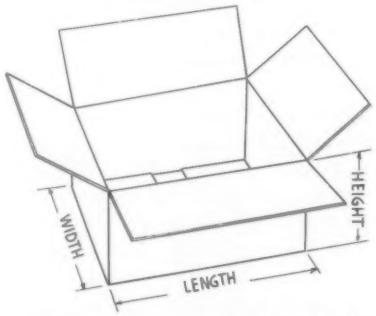
Instead, the two opposite sides should be used. The ruler is placed on the box, and the distance across the slot to the edge of the board in the next panel, including the slot width, is measured. For instance, the width would be measured from position 3 to position 5, as shown in Figure 1, but *on the outside* of the box. This will nearly always give the same measurement as the center-to-center score-measurement if the box were opened and placed with the inside face up on the table. When measuring a box in this manner, the joint need not be disturbed, and the box is ready for use without re-taping.

METHOD FOR SEALED CASES: There are times when it is necessary to measure a box made up and sealed, and the sealed case must not be disturbed. Under this circumstance, only an approximate measurement can be made at best. Normally, the two faint scoring lines on the outside of a box have been stretched farther apart by bending, and also, the lines are not always distinct. If an A-flute board, 3/16″ thick, is used, measurements are made between the two closest score lines, and 3/16″ is added. This measurement will come close to the inside "center-to-center of score" measurement.

METHOD FOR BOXES WITH OVERLAPS: We mentioned previously that two ways of measuring corrugated boxes are used, using the "center-to-center of score" method. The second way involves essentially the same method adapted to full overlap special slotted boxes, or any box with partial overlapping flaps. This type of box should be made by what is



2. In this illustration of center-to-center of score dimension, the dotted line represents the single line score on the inside of the box, with the two parallel solid lines indicating the fainter scores on the outside.



3. As set up ready for use, this regular slotted container is marked to illustrate the usual way of enumerating dimensions, in terms of length, width and height.

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termed reverse-scoring. In other words, the single-line score horizontally across the box (top and bottom) is made on the *outside*. The two lightly scored, parallel lines then appear on the inside of the box, when made up.

To measure this reverse-scored box, the length and width are measured exactly the same as for a regular slotted case, on the inside of the box, laid out flat. But the height or depth measurement is taken on the outside of the case, again by marking the center of the horizontal scores at the top and bottom, and by placing the ruler across these scores for proper reading.

METHOD FOR INSIDE DIMENSIONS: It was stated previously that most box makers seem to prefer the "inside dimension" pattern for specifications. Obviously, a corrugated or a solid fibre shipping container must carry the item or items intended to be packed therein, and the box must be built to proper size for the purpose.

If a box is too large for its merchandise, extra packing material, and extra labor to insert it, will be necessary. This increases the cost of packing. Should the box be too small, it is very likely that it cannot be used at all, or else that extra time and labor are required to "shoehorn" in any material packed. Another objection to a too tightly packed case is the probable increase in breakage or damage to contents, and the joint may open up by rupture of the taped or stapled corner.

Inside Dimension Problems

So, while inside dimensions must be determined, *measuring* the length, width and height of a made-up corrugated box presents problems. The length and width are easily measured, but it is always advisable to measure them at both ends and on both sides. The two parallel measurements rarely agree. An average of each pair of measurements might be the best estimate of the length and width, but the exact inside dimensions are not too definite.

As to the depth, actually the measurement should be taken as the distance from the bottom, with the end of the ruler resting on the bottom of the box to the score line at the top. Yet, when the case is sealed on top, the inner flaps normally will dip below this score line (in the middle of the box) by an amount equal to the thickness of the board. Unless there is sufficient space in the box for the upper side of these flaps to rest with their ends at the score line, the sealing will leave the case too tight.

A made-up empty box, sealed top and bottom, can be measured inside by diagonally cutting off one corner. Certainly that end of the box can then be measured for the apparent length, width and height, by insertion of the ruler into the box. To take the measurement of only one box, is risking error, and more than one box must thus be destroyed in obtaining the measurements. With a solid fibre case, cutting off the corner is difficult, and destroying the box certainly does not cut costs.

MORE OBJECTIONS: Because corrugated board at times does not always break at the score lines, the opposite end may have measured slightly differently. Also, if the sample measured was sealed by hand, the inside dimensions would very likely be different than if it was machine-sealed. Further, on any production run the case sealer is set up each time, and certainly height will vary inside a case according to the adjustments on the machine. Automatic sealing, therefore, could easily be different from hand sealing, so far as resulting inside dimensions are concerned.

The box maker must also calculate additions to length, width and height according to the type of corrugated board he will use. My own experience has shown a variation of ¼" in height of corrugated boxes when made by different box makers, using the same specified inside dimensions and the same type of board.

My observations on this manner of measuring a corrugated box serve to show the reasons for using the "center-to-center of score" measurements as logically the best method. As has been pointed out, it is much less wasteful of boxes on inspection, and certainly is less apt to create disagreement between box maker and consumer.

Peter Henningsen is a graduate of the University of Minnesota with a B. B. A. degree in industrial engineering. He subsequently started working for Minneapolis-Honeywell as the first full-time packaging engineer for its then newly-formed aeronautical division, and has occupied this position for the past six years. He is a member of the Society of Industrial Packaging and Materials Handling Engineers and is president of its Minnesota chapter. Also, he is a member of Committee D-10 on shipping containers, American Society for Testing Materials.

Engineering of package starts when product design begins

By Peter Henningsen,
Packaging Engineer,
Aeronautical Division,
Minneapolis-Honeywell Regulator Company,
Minneapolis

Rapidly successive changes in details and types of aircraft parts accentuate the importance of bringing the packaging engineer into the picture at the time when product design itself is under discussion. This is how they do it at Minneapolis-Honeywell's aeronautical division, whose packaging engineer, in this article, reviews their procedures and cites examples illustrating proper package development.

A number of elements must be combined in just the right manner to accomplish the most economical package design to adequately protect the product to be packaged. These include such widely varied areas as knowledge of the product, selection of the best packaging materials, proper application of the materials, means of distribution of the product, and methods of transportation utilized in shipping the product. Package design must adequately reflect all of these factors if it is to be properly engineered. This article will explain how our company has established a successful formula for engineering package design.

For many years, the fate of the packaging engineer has been to establish package design at the time when the product is ready to be shipped. This is more often true in the area of industrial packaging than it is in consumer packaging. This places the test of the packaging on the success or failure of the initial shipments.

Many firms have as yet failed to recognize the importance of packaging to the success of their business. Packaging is treated as a part time job and assigned to someone in the firm who is already assuming too many duties. There has been failure on the part of management to recognize the fact that packaging is a science and requires the services of a full-time engineer.

Professionalization Trend

In recent years the picture has been changing. A four-year course leading to a degree in package engineering has been established at Michigan State University. Many colleges and universities around the country are offering seminars and extension courses in packaging. The professional status of the packaging engineer has been enhanced by such groups as the Society of Industrial Packaging and Materials Handling Engineers, Packaging Institute, and American Management Association in the presentation of their educational programs. In addition the American Society for Testing Materials through Committee D-10 on Shipping Containers, the National Safe Transit Committee and the military services have emphasized the importance of properly designed packaging to prevent damage.

This brief synopsis of the package engineering profession has been presented to aid in understanding the importance of establishing a definite procedure for package design. There

are five major areas in the development of proper package design.

A. The packaging engineer's relation to the company organizational structure.
B. Material testing.
C. Consultation with product design engineers.
D. Development of package design and initial testing.
E. Verification of package design with test shipments.

These areas are treated in detail in the following paragraphs.

A. The packaging engineer's relation to the company organizational structure

The position of the packaging engineer in the organizational structure of a company reflects the importance placed on packaging. Fortunately, our company has long recognized this importance, and the organization as described is only one of several different ways of handling the job.

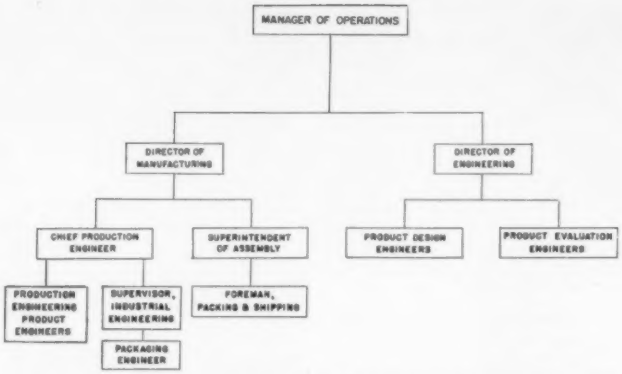
A simplified picture of our organization structure is presented in Figure 1. The design engineering function is that of originating the products to be manufactured. The product design is analyzed by the product evaluation engineers and proper package design is included in this evaluation. The production engineers establish producibility and define methods for manufacturing the product.

The packaging engineer is a part of the industrial engineering function and as such cooperates with all the above groups to establish package design.

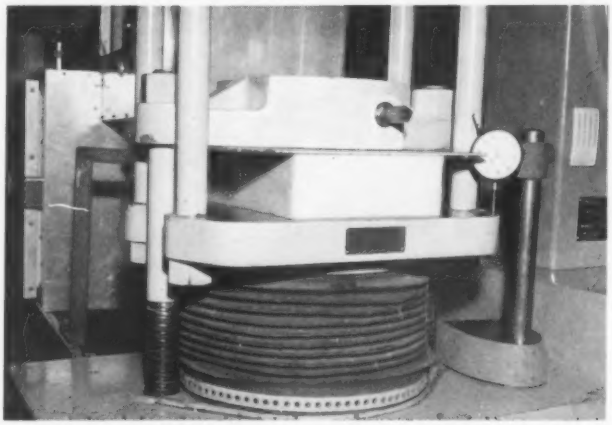
B. Material testing

The first thing to consider in the development of package design is the proper selection of materials. The list of materials to choose from is literally endless, and the only way to insure the correct application is through testing. A general breakdown of the major areas in which material testing is applicable is as follows:

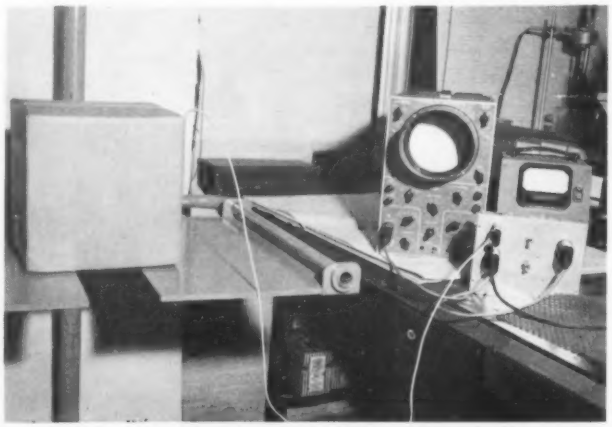
1. Intimate wraps
   a. Desirability of neutral wrap.
   b. Grease proofness.
2. Materials used to secure product in container.



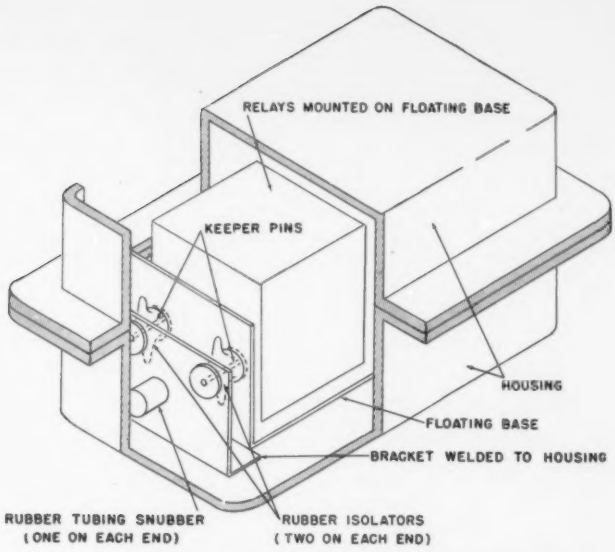
1. This simplified organizational chart shows the location of the packaging engineer with reference to other departments within the company's aeronautical division.



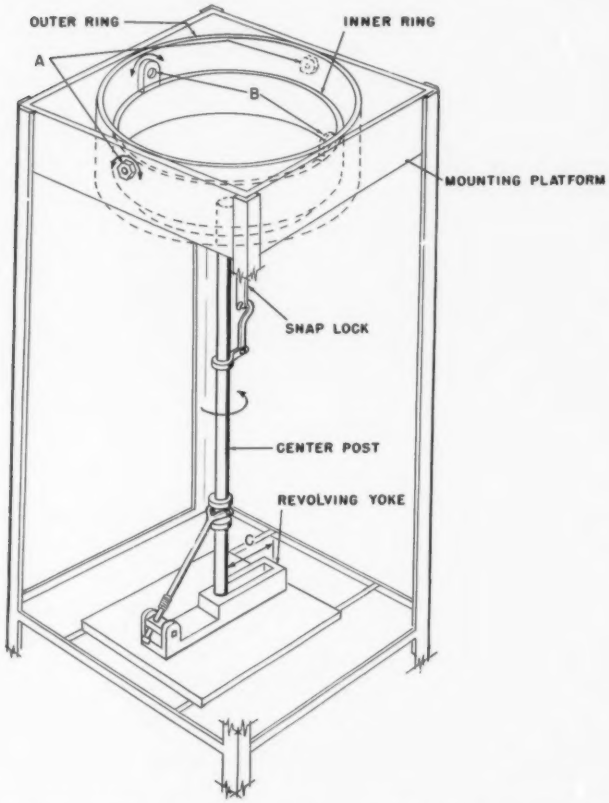
2. Compression testing of resilient cushioning material on a universal testing machine. The load is applied until a 100 per cent increase in load produces a change in displacement of less than two per cent. These results are plotted graphically with the load in pounds per square inch as ordinates and the deflection as a percentage of original thickness being the abscissae.



3. Apparatus for dynamic testing of cushioning materials. Tests thus far have been conducted by mounting a crystal accelerometer on a dummy load. The use of this in conjunction with the oscilloscope gives the resultant shock at the moment of impact.



4. The rubber isolators initially used allowed excessive vibration, damaging relays in shipment. This problem was solved by using stiffer rubber for the isolators and the snubbers, to provide increased damping. Also, keeper pins were inserted through the isolators to limit the amplitude of the vibrations.



5. The outer and inner rings are free to rotate as indicated by arrows. The center post moves as indicated by arrows at C. The prevention of rotation of the rings in two planes combined with the necessity of maintaining center position for the center post involved complex blocking. Addition of the snap lock to the center post prevented movement of the inner and outer rings in their rotational axes.

a. Wood.
   1. Moisture content.
   2. Type of wood.

b. Resilient cushioning.
   1. Abrasiveness, waterproofness, neutrality.
   2. Static and dynamic loading properties.
   3. Proper density.

c. Non-resilient cushioning (such as corrugated pads or fillers).
   1. Desirability of neutral material.

3. Unit, intermediate and shipping containers tested for strength, durability, material and applicability.
   a. Fibreboard and paperboard.
   b. Wood.
   c. Metal.
   d. Plastic.
   e. Glass.
   f. Other.
4. Adhesives used for closure and labeling tested for waterproofness, bonding strength and applicability.

This list is not all-inclusive but serves to highlight the areas in which testing is of the utmost importance. For many of these materials the tests are performed as routine inspection test by the manufacturers and need not be repeated. However, material requirements should be established in purchase specifications which indicate performance to be met by the suppliers.

Protection Against Shock

An example of material testing by our company occurs in the area of resilient cushioning materials. We manufacture delicate electronic instruments and must design packages to give adequate protection from shock, using the most economical materials. Such materials as rubberized curled hair, creped cellulose wadding, foam and sponge rubber, foamed plastics, polyurethane and fibreglass are adaptable to cushioning applications and it would be impossible to select the best one without knowledge of performance characteristics.

We initiated our testing in the area of static load properties of the ma-

terials. An illustration of one phase of this test is shown in Figure 2. This demonstrates the application of a load and measurement of subsequent displacement or compression on a universal testing machine. Other phases of this test include determining permanent set and efficiency.

A further need to fully evaluate these cushioning materials exists in the area of dynamic loading properties. The establishment of standard test procedures for dynamic testing has only recently been approached. Our company has initiated experimental testing using the apparatus illustrated in Figure 3. We have been using a four-inch cube weighing five pounds and constructed of aluminum.

A crystal accelerometer is mounted to this block and connected to an oscilloscope. Readings are taken from the oscilloscope at the time of impact. The oscilloscope is calibrated in terms of "G's". A one-"G" shock on the test block indicates a force of five pounds. Testing has not advanced to the stage where any conclusive facts can be stated but it is evident that there are many variables to consider in proper package design. It is also apparent that using static loading performance alone does not result in the most economical package.

C. Consultation with product design engineers

The most important aspect in the development of proper package design is in the consideration of packaging *simultaneously* with product design and development. The procedure we have developed to accomplish this has evolved through recognition of the importance of packaging in the production process.

In our business we have a continuing flow of new products. This presents the need to keep abreast of the most efficient materials and methods used in packaging. Once an idea for a new product is established our product design engineers, production engineers and design evaluation engineers form a team to efficiently bring the product to the actual production stage. During this period evaluation is made entirely from preliminary blueprints.

The packaging engineer is a part of this team and becomes familiar with the construction of the complex electronic instruments. In the many informal discussions surrounding product development it is the aim of the packaging engineer to ascertain the most delicate element of the product and determine if packaging can protect it from damage without excess cost.

This damage may be in the form of dented cases, broken structural members, internal breakage rendering the product inoperative, or it may occur as scratches on highly polished surfaces or corrosion of unprotected surfaces. Every packaging engineer, no matter what product is involved, has this problem.

Examples of some of the problems occurring when package design is not considered simultaneously with product development are illustrated in Figures 4 and 5.

In the first case the unit involved was simple in construction and the relay assembly pictured was shock-mounted inside the housing to absorb vibrations when installed for use. Actual shipments arrived at their destination with damaged relays due to excessive vibration of the assembly.

Experimentation with package drop tests proved that no degree of practical package design could prevent this damage as the internal vibration was only increased by resilient cushioning materials and non-resilient materials transmitted shocks of damaging magnitude. The problem was eventually solved by increasing the stiffness of the rubber isolators and inserting keeper pins to limit the extent of vibration and still be acceptable for end use requirements.

The unit illustrated in Figure 5 is relatively heavy and the problem of blocking to prevent damage was complex and time-consuming. The outer ring is supported at points A and the inner ring is supported at points B. These rings are connected to a mounting platform which when activated revolves in a wobble pattern. This is accomplished by forcing the center post away from the center to the extreme end of the revolving yoke. This center post revolves in a conical pattern causing the platform to wobble in two planes simultaneously.

Unless properly blocked to prevent any movement, only a comparatively low shock will cause shear failure in the bushings supporting the inner ring. We always attempt to design packaging in the simplest manner to prevent misinterpretation of the method by the packaging and shipping personnel. This was difficult to accomplish in blocking required for this unit because the inner and outer ring rotate in two separate planes.

However, consultation with the product design engineers developed a design change involving only the addition of a snap-lock to the center post and a tension spring in the revolving yoke to prevent movement of the platform, reducing the required blocking to that necessary to secure the unit in the shipping box.

Both of these problems could have been reduced or eliminated by consideration of packaging problems concurrent with product design.

In the past many problems of possible damage have been solved unknowingly through over-packaging. With the emphasis on minimum cost and cubage it is essential that the packaging engineer have an opportunity to question the design components, that cannot be economically packaged to prevent damage, before the product reaches the production stage.

A secondary advantage of this product familiarization in the early stages of product design applies to the area of spare parts packaging. Most spare parts fall in a cost category that prevents incurring the expense of engineering a package. However, the engineer can at this time acquaint himself with those sub-assemblies that are delicate and difficult to package and design adequate packaging well in advance of shipment.

D. Development of package design and initial testing

The knowledge gained through the procedure outlined above is applied in the development of package design. The packaging engineer approaches the problem in the following manner.

1. He first considers the element or elements of the product design to which damage is likely to occur.

2. The next step is to evaluate the materials available to provide the protection required. This may involve such materials as wooden blocking, corrugated pads or inserts, or resilient cushioning materials depending upon the degree of protection and the type of product involved.

3. The engineer then decides on the container required. This includes consideration of customer requirements, method of transportation, probability of palletized shipments or grouping of unit packages in a single shipping container.

4. The package decided upon is then subjected to rough handling tests designed to assimilate anticipated hazards of handling and shipping.

The majority of our products weigh under five pounds and we design the unit package to meet rough handling requirements without regard to the probability of multiple packing in shipping containers. This is to be in accord with handling practices of the customer. In many cases the unit package is also the shipping container, this is true of many products other than our own.

We have designed our rough handling tests to meet our own requirements basing them on the drop tests as specified in A.S.T.M. D 775-47 and by the National Safe Transit Committee. The small size of our packages led to the establishment of a 30-inch drop height. Most specifications required a total of five samples in the test lot. The wide variety and low volume production of many of our instruments has led us to set a standard of two units per test.

In addition, many of our units are quite expensive and subjecting more samples to what are considered to be the worst conditions anticipated was deemed unnecessary. It would be a brave packaging engineer who could subject five $1,000 instruments to destructive testing of the type described. If test results indicate this approach is incorrect we will then increase the sample size.

Our testing is conducted on the apparatus pictured in Figure 3. The packages which are too large or heavy for this test are subjected to the incline impact test or the drop cornerwise test in which one corner is supported on a block 12 inches high, and the opposite corner raised to a predetermined height and dropped. The tests are performed on the first instruments available prior to actual production. It is our practice to manufacture pre-production models of every instrument produced. These instruments are thoroughly checked for performance by our design evaluation engineers. Package design is a part of overall product design evaluation.

E. Verification of package design with test shipments

We have experienced a very low percentage of package failures when following the procedure outlined. The demand for our products is such that on the initial instruments shipped we are informed very quickly by our field engineers of any damages attributable to packaging. Due to the nature of our products we must design our packages for 100 per cent success rather than the 95 to 98 per cent of many other industries. However, there is always the possibility that some component part may be subjected to abnormal shocks acting in just the right axis to render damage. This requires further analysis to decide whether the incident was just by chance or whether the protection afforded must be increased.

This procedure described is our solution to the problem of adequate and economical package design. It is a thorough procedure due to the delicate and complex nature and the high value of our products. This procedure can be applied to many different industries no matter what products are involved. Freight losses are expensive and create unfavorable reactions. The important point is to give packaging the recognition it deserves as a part of the production process. In order to adequately perform his function, the packaging engineer must be a member of the team that develops the *product* design.

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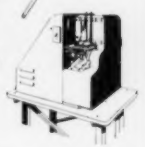

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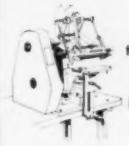

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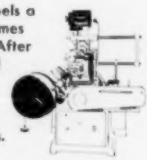

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AMA reviews printing quality, adhesion, packaging direction

Here are some highlights of American Management Association's 25th anniversary packaging conference: Speakers throw new light on accurate measurement of printing quality; development of an adhesion policy as an overall concept, and use of the committee approach to the problem of managing the packaging function.

Accurate measurement of printing quality, development of an adhesion policy, organization of the packaging function within a company — all these topics were among those receiving close examination from speakers at the American Management Association 25th Anniversary National Packaging Conference held recently in Atlantic City. The 1,000-plus registrants at this conference received not only a thorough briefing in practical techniques of the day's work but also an exposure to some of the forward thinking of the packaging field.

Measuring Printing Quality

"Quality means an all-inclusive sample, representing the best, the average and the poorest, and how closely the best and the poorest look alike," Donald Macaulay, Paper & Printing Quality Control, Inc., Chappaqua, New York, told the conference audience. In discussing the accurate measurement of printing quality, he stressed the importance of defining the terms used, as an aid in reaching standards by which to measure printing. Distinguishing "conformance" quality from "ideal" quality, Mr. Macaulay pointed out that conformance quality means simply how uniformly any particular samples represent some agreed "okay" between supplier and user.

Pointing out that any statistical approach to quality represents the use of variables and attributes as measures, he noted that variables may be measured by instruments without involving human judgment. Attributes, on the other hand, require human decisions, such as in evaluating visual properties. "It is necessary, therefore, to set up standard defect values with human judgment, for both the decorative and functional qualities of packaging materials," Mr. Macaulay asserted. "If we can reduce those decisions to a numerical value, they then become reproducible — and then become a matter of record comparative to other records."

Underlying all of this is the concept of the distribution curve, which represents a repeating pattern of causes at work affecting the men, materials and equipment involved in producing the printed (or any other) work, he explained. "This repeating pattern will continue as long as the same chance causes continue to repeat themselves. Therefore, from the fact that this pattern repeats, comes the ability to predict the limits of the process in the future, providing there is no fundamental change. This is all there is to the scientific basis of statistical techniques," Mr. Macaulay declared.

Importance of this distribution curve and predictable limits is that any departure from the pattern is a sure sign that something is wrong, he observed. This means some basic change has occurred and there is some assignable cause of variation to track down and eliminate.

But this means that the usual concepts of good, fair and poor, in regard to what a buyer of printed packaging materials will accept or reject, must be reduced to scores, or numbers, he suggested. This means assigning numerical values to major and minor defects. Further, the buyer sets up a specific acceptance criterion; using such tools as charts and forms, he can train personnel to determine and evaluate the standards when inspecting samples.

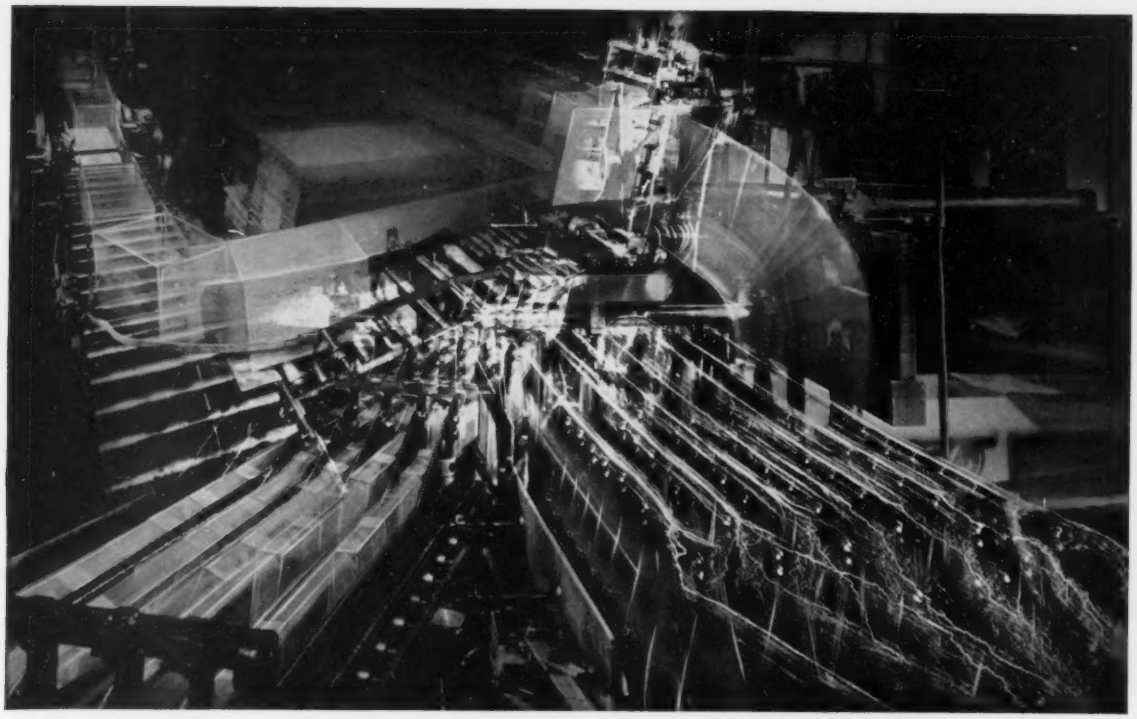
"The control or evaluation chart intrigues all people because it gives a graphic picture of quality tied up (if it is so planned) with the operator, the yield, the machine and any other significant data. It immediately catches any significant drifting from accepted standards, and tells how much and where anything is better or worse than standard," Mr. Macaulay concluded.

Getting An Adhesion Policy

"The adhesion operation is but one link in the chain of events called the adhesion system," Dr. Frank C. Campins, Polymer Industries, Inc., Springdale, Connecticut, told his audience. "An adhesion policy aims at the insurance, the economy, and the progressiveness of the adhesion operation."

In discussing the adhesive function Dr. Campins noted that a good bond is defined by the functionality of the bonded stocks and *not* by the bond strength. Thus, each function places different demands on the criteria of goodness, he explained, noting that the requirements may be as far apart as (a) soft, yielding and having slip, or (b) hard, fibre tearing.

Stressing the importance of operational analysis, he pointed out that means the method of discriminating the priority of properties for each job: "Only the dynamics of performance of the bonded stocks will determine what is good, for there is a pri-



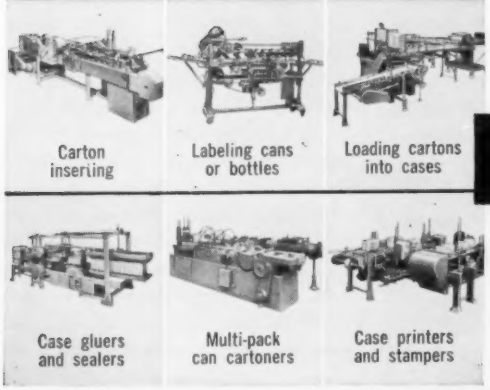
Packages in motion toward lower costs

ABOVE: *Composite motion study of a Standard-Knapp Model 830 Bottle Packer and a Model 830 Carton Packer at work reducing costs of bottle and carton case loading.*

On a Standard-Knapp 830 Bottle Packer, your containers move with quick precision into shipping cases. You are assured of a full load pattern every time. Steel fingers guide containers exactly into position. Each case is raised to receive the pack by means of a lift table which is cushioned as an assurance against damage to container or case.

The same smooth, constant-flow motion is obtained with Standard-Knapp Carton Packers. Each step in the packing operation is devised to combine maximum efficiency with gentle handling action. But that's not all — you can count upon continuity of operation.

Every motion of a Standard-Knapp machine is delivered by a mechanism ruggedly and precisely constructed to remain efficient under continuous 24-hour operation — dependability is inherent in S-K design, construction and performance. You take no chances with Standard-Knapp equipment. It steadily keeps your packaging costs moving downward. For more information about our Can, Bottle, Carton and Bag Packers and other packaging equipment, write Dept. O for our catalogs.



STANDARD-KNAPP

DIVISION OF EMHART MFG. CO.

PORTLAND, CONNECTICUT

Latin American Representatives: American Steel Export Co., New York, N. Y.

ority of properties for each job," he said.

An operational analysis shows that the adhesion operation is based on the *complementary* relationships between the adhesives, the stocks, and the engineering manipulation. Further, the engineering manipulation itself is a sequence of (1) application, activation, (2) bridging, forming, and (3) establishment of equilibrium. In addition, Dr. Campins explained that the product and the process form the complementary *static* and *dynamic* aspects of the operation. As a result, he noted, testing to insure performance involves the integration of static and dynamic properties.

This means that the big problems of all testing include (a) the establishment of the critical aspects of the dynamics of performance demanded of the bonded stocks, and (b) the setting up of simple (static) tests that tie in with these critical aspects.

Thus, operational analysis focuses on the stock and the adhesive so as to tie into the dynamics of performance. "The complementary static and dynamic relationships between stock and glue must be understood to set up policies for testing. A thorough grasp of these complementary relationships forms the basis for the synthesis of a progressive adhesion policy," Dr. Campins emphasized.

He noted further that the implications and consequences of these relationships must be analyzed closely so as to establish how to achieve the minimum cost (insured) adhesion and how to pave the path for progress. The concept of insurance in regard to adhesion begins with knowing and providing for the end requirement of the adhesion system so that the chain of the system (of which the adhesion operation itself is but one link) is not broken by a weak link in the adhesion operation, according to Dr. Campins.

Using A Packaging Committee

Participants in a three-part discussion of the organization of a packaging committee included William T. Egan, Colgate-Palmolive Company, Jersey City; Clayton Henrichs, Ayerst Laboratories, Inc., Rouses Point, New York, and F. H. Wiley, International Harvester Company, Chicago. These speakers reviewed the intra-company relationships involved in managing the packaging function within their respective organizations.

Packaging is one of four divisions of the research and development department at Colgate-Palmolive, and the head of packaging reports to the vice president in charge of research and development, Mr. Egan explained. Within the packaging section there are five divisions: These deal with packaging changes, design, specifications, laboratory and cost analysis.

Further, the section works closely with the company purchasing department, its cost department (developing costs and supplies data for all plants) and market research. In addition, Mr. Egan noted, the company industrial engineering department assists the packaging section in coordinating its work with the production department, especially on equipment requirements. The automatic machinery department and the packaging section work together on specifications for packaging in relation to packaging machinery.

Within the research and development department, the packaging section works very closely with development sections for drug and toilet goods and for soaps and synthetic detergents. Also, it depends on the R & D technical services section for analytical work, quality control and similar assistance, he observed.

Ayerst Laboratories has a packaging committee that includes the vice president of sales, the vice president of production, the director of advertising and the director of product development, who is chairman of the committee, Mr. Henrichs related, pointing out that this group directs the activities of the plant technical committee. This committee includes the vice president and assistant vice president of production; the production superintendent and his assistant in charge of packaging operations; the purchasing agent, quality control manager and traffic manager, and the methods engineer.

The plant technical committee meets once a month to discuss current packaging problems handed to it by the packaging committee, and to determine a course of action on each. Mr. Henrichs explained that within this group it becomes the job of one person to obtain every viewpoint and follow up within the framework established, obtain the sample units needed, work them into the laboratories, highlight the cost changes, receive all the reports and compile the story. After all information is organized, the entire matter is presented to the vice president of production, who in turn presents it to the packaging committee.

What It Does

Reviewing the advantages of this type of committee operation, Mr. Henrichs said that (1) it gives a more exact study of their needs than otherwise would be available, (2) makes everyone aware of what is needed and why, (3) results in fewer last-minute changes, since all factors are available before the final decision is made, and (4) gives the different departments a better understanding of each others' problems.

On the other hand, to operate in this manner there must be a written policy for each group, Mr. Henrichs asserted: "This must include the scope of work for each group and the duties of each person comprising the group. Of course, without diligent administration the very best scheme can fall down, and the advantages of many voices and eyes will be lost."

International Harvester Company has a parts packaging policy committee, which consists of the vice president of supply and inventory, as chairman; the vice president of merchandising services, and the vice president of manufacturing, Mr. Wiley told the conference. Reporting to this committee he explained, is an operating committee consisting of representatives of line and staff departments, including order and distribution, general sales, motor truck sales, consumer relations, price and contract, industrial power sales, and manufacturing research.

This committee develops recom-

mendations for policy and provides solutions of individual problems. To convert policies into operating procedures, there are two sub-committees, one of representatives of manufacturing operations and the other from sales departments. Each representative on this committee has a specific interest and responsibility in its decisions, he noted.

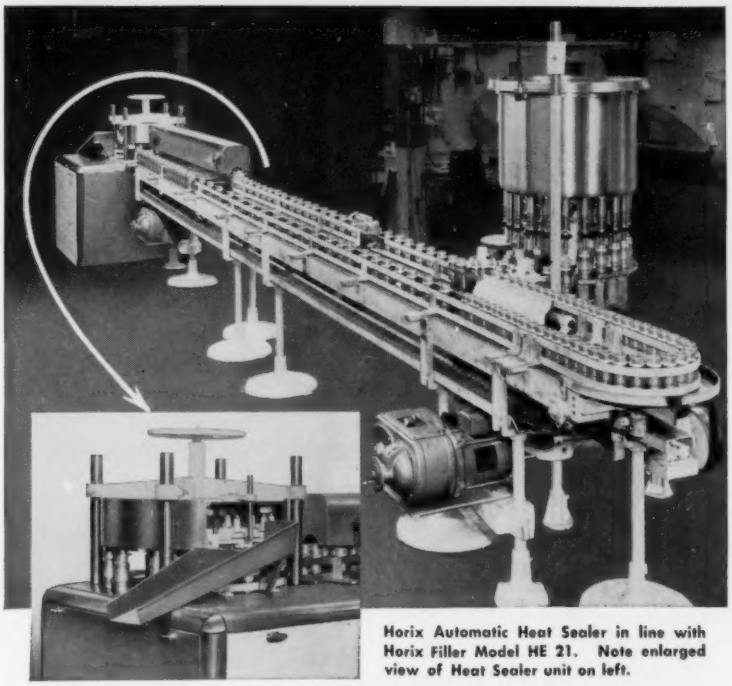
Before the establishment of the parts packaging policy committee, the company's materials handling committee developed many operating procedures on packaging. This group continues as a forum on common packaging problems, with the packaging committee formulating general policies.

The materials handling committee is composed of the materials handling engineer from each manufacturing works, with representation from foreign operations, traffic, scheduling and distribution, materials control, and consumer relations. It uses sub-committees from time to time to develop specific programs of common action and divisional interest. Further, this committee retains responsibility for approving packaging materials standards. Inspection procedure (for these materials) is strictly a works and divisional responsibility, Mr. Wiley explained.

Develops Packages

As one of its responsibilities, the manufacturing research department's laboratory reviews, tests and designs packages, as well as packaging materials. Further, the department's materials handling section develops standards, which represent the crystalized opinion of all who are concerned with any given standard.

To administer all of the overall packaging program, which itself is part of International Harvester's flexible distribution system designed to meet the peculiar requirements of the products it manufactures and sells, the operating departments have definite responsibilities and the key man is the materials handling engineer at works level, Mr. Wiley emphasized: "It is his interpretation and application of the overall policy that insures the desired results."



Horix Automatic Heat Sealer in line with Horix Filler Model HE 21. Note enlarged view of Heat Sealer unit on left.

HORIX NOW OFFERS—

AUTOMATIC FILLING AND HEAT SEALING OF NEW TYPE PLASTIC BOTTLES

Here is the first practical *automatic* method of heat sealing bottom discs on the new type plastic containers.

Operation is simple. Containers are filled "upside down" . . . bottom discs are dropped into position by operator and heat sealed in place . . . closed containers are automatically ejected from metal holders onto a conveyor, ready for packaging.

- **Entire operation is smooth, continuous**
- **Perfect union of bottom disc to tube is assured**
- **Accurate fill prevents leakage at welded end**
- **Aluminum holders fit any size container**
- **Heat Sealer is available as a separate unit**
- **Heat Sealer operates at any speed up to 180 c.p.m.**

A proposal to suit your requirements, or further information on our filling and heat sealing equipment will be gladly furnished. Horix fillers are built in a wide range of sizes, and Heat Sealers can be quoted to coordinate with any production speed. Holders can be provided with adjustment feature for various container sizes. Container height adjustment on the Sealer is made by the simple turn of a wheel.

Write for Bulletin No. 155-P. It illustrates and describes Horix's entire line of liquid fillers for TIN, GLASS, or PLASTIC.

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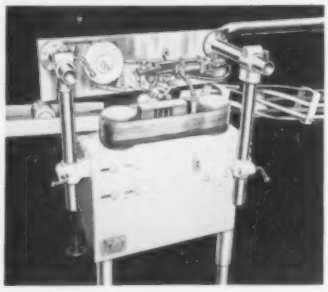
Outsert Applicator

The Pfaudler Co. announces its Model OA-3MC outsert applicator, a machine that attaches outfold leaflets to cylin-



drical containers, whose dimensions range between 2⅝" and 7¼" long and 1¼" to 6½" outside diameter. After a feeder lays the outfold in a predetermined position on the container, a tape dispenser feeds a correct length of tape to secure the outsert to the container. Outserting takes place after containers receive their labels and before they move to a caser. Its speed varies up to 220 containers a minute, depending on container size. Circle No. 1.

Film-Paper Lamination

The Specialty Papers Co. has a new film and paper lamination developed through a method of stretch-laminating Goodyear Pliofilm to paper and board. It reports that when this film is laminated to a printed surface, it enhances the colors of the inks. Resistance to dust and scuffing and stain- and grease-proofness are among the protective properties reported for this material. Circle No. 2.

Plastic Packaging Machine

Comet Industries reports that its new "Mercury" unit automatically packages products in either bubble or contour packages — through lamination of two

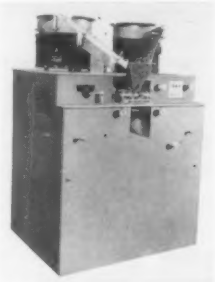
sheets of clear plastic at speeds between five and 20 feet a minute. This equipment inserts the product packaged, heat seals, prints and trims individual packages or rewinds succeeding packages into a continuous ribbon. It uses the "Rol-Pak" process of continuous vacuum forming of packages for small items. Circle No. 3.

Bag Closing Equipment

George H. Fry Co. announces its Model CSG semi-automatic heat sealer and gluer for automatic, square and flat paper bags. Operating continuously without reciprocating or cyclic motion, this machine provides a siftproof closure where the bag top is not glued down against bag contents. It can heat seal and glue or can merely double-fold and glue a bag closure. There are covers for the protection of moving parts against dust and dirt. According to Fry, this machine requires no installation. Circle No. 4.

Hardware Packaging Machine

Brown Bag-Filling Machine Co., Inc., says that its new "Formpak" machine forms a packet from a single roll of heat sealable stock, fills it with a predetermined count of small items, such as screws, nails, nuts or washers, and seals each packet. Production speeds range between 70 and 100 packets a minute, with package sizes varying between 2" by 2½" and 4½" by 5". Brown notes that changes of packet



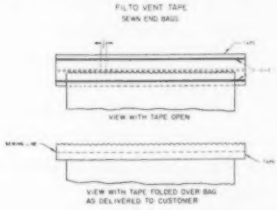
size may be made without requiring spare parts. Circle No. 5.

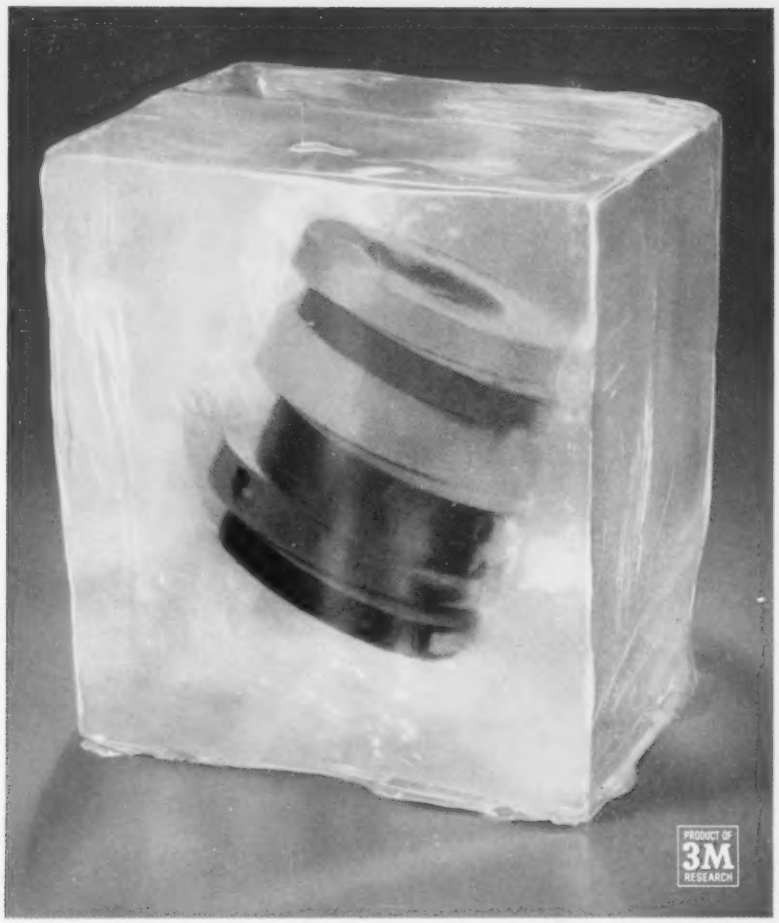
Pressure-Sensitive Teflon Tape

The Connecticut Hard Rubber Co. announces its "Temp-R-Tape TH", a new 0.013" pressure-sensitive Teflon, developed as a heavy duty, non-stick facing for gussets, fins, forming dies and heat sealing bars on packaging machinery, as well as food and beverage processing machinery and the like. According to its producer, it has a useful temperature range from minus 100 degrees F to 400 degrees F, and has an adhesion rated at 50 ounces. Its roll widths range between ¼" and a full inch. Circle No. 6.

Air Escape From Bags

St. Regis Paper Co. reports that its "Filtovent" tape makes possible the





Tape that holds in freezing cold!

So cold-resistant, it holds at 40° below zero . . . so wet-proof, it transmits less moisture than even a wax-impregnated carton. "Scotch" Brand Acetate Fibre Tape is tough, long-aging, dimensionally stable, *and printable;* meets government packaging specification JAN-P-127. 12 colors: red, green, orange, blue, orange-yellow, light green, yellow, light blue, white, black, silver, and gold, plus transparent. Ask your "Scotch" Brand Tape distributor about acetate fibre tapes, or send for complete descriptive folder.

Always specify "Scotch" Brand, the *quality* tape . . . and stick with it!

ACETATE FIBRE TAPE . . . *one of more than 300 pressure-sensitive tapes for industry, trademarked . . .*

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SCOTCH BRAND

Look what you can do with it!

SEAL surface-treated cartons quickly, easily with "Scotch" Brand Acetate Fibre Tape and "Scotch" Brand Type M Box Sealer. Short strips of tight-sticking tape are applied automatically as box is passed over roller.

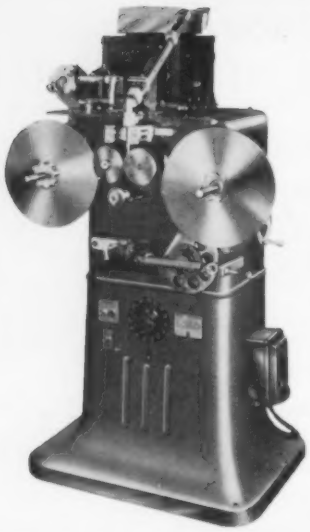
ADD labels or premiums to cans and boxes, or to product itself. *Printed* "Scotch" Brand Acetate Fibre Tape can be applied automatically to any flat surface with "Scotch" Brand Flat Surface Applicator.

TREATED wrappings, paper, cartons, etc. present no problem to printed "Scotch" Brand Acetate Fibre Tape. Special adhesive sticks at a touch . . . holds securely despite cold or moisture.

SEND FOR FREE FOLDER describing properties and uses of "Scotch" Brand Acetate Fibre Tapes. Just write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. LY-66

The term "Scotch" is a registered trademark of Minnesota Mining and Manufacturing Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

3M COMPANY



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WRAP-ADE Unit Packagers are versatile, low cost machines that perform an entire cycle of packaging operations including feeding, filling, forming and sealing practically every type of heat sealing materials.

UNIT PACKAGER WITH SPECIAL HOPPER FEED

Products such as picture hooks, nails, screws, hardware parts, etc. are most efficiently and economically packaged by a Wrap-Ade special automatic hopper feed unit packager. (See picture of machine above.) In cases where 2 items must be combined simultaneously and uniformly in one package, the hopper feed solves the problem. Wrap-Ade can develop this special equipment at "standard machine" prices.

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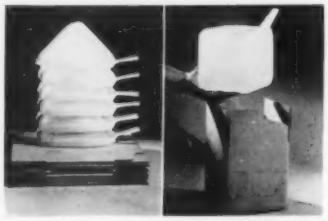
PE-6

escape of air during the filling of multi-wall bags. This tape, placed on one or both ends of a bag, is perforated, and allows air to escape between stitch lines and through pinhole perforations. The producer suggests that this bag feature gives best results where the bag uses an asphalt or nonporous sheet and where the bag is of minimum size, very tight when filled. Circle No. 7.

Cube Type Container

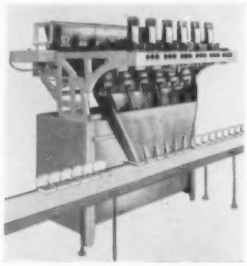
Hedwin Corp. has a new container for liquids, using a semi-rigid cube-shaped insert package of Bakelite polyethylene



and an outer corrugated box. After the polyethylene container is expanded and filled, it is heat sealed at the end of the spout. Called "Cubitainers," these packages are furnished collapsed and stacked, prior to use. For pouring the spout may be cut partially or fully. Die-cut flaps of the box form a handle. Circle No. 8.

Automatic Net Weight Scales

Hayssen Manufacturing Co. announces its development of a line of automatic net weight scales, which use a triple-



vibrator feed to assure even distribution of product from feed to scale. Controlled by the balance chute, the feed trough maintains an even supply of product to the bulk and dribble troughs. After the flow in the bulk trough stops short of exact weight, the flow continues through the dribble, to reach exact weight. Settings on the self-locking poise are graduated in 1/64-ounce increments. Circle No. 9.

Cellulose Wadding

Personal Products Corp. says that its new cellulose wadding, "Cel-Fibe", does not powder or bunch, and can be stitched, seamed and grommeted. It

comes in rolls 55" and 5½" wide. Ease of handling is a major feature of this new material, according to its producer. It is designed for both wrapping and cushioning applications. Circle No. 10.

Vacuum Filling Machine

Stokes & Smith Co. reports that its "EG" universal filler now uses the "Auger-Vac" method of volumetric filling, whereby a vacuum is drawn on any rigid container, after which the desired fill is delivered by the auger. When filling is complete, the vacuum automatically releases to free the container from the sealing gasket. The vacuum unit operates through an attachment assembly at the delivery tube of the filler. According to the producer this system permits virtually dust-free packaging of powdered products. Circle No. 11.

Strapping Tape Cutter

Permacel Tape Corp. announces an adjustable cutter for use with heavy duty strapping tapes. It is made of

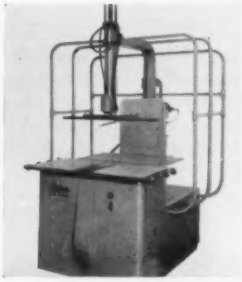
molded plastic and has a steel cutting edge, to handle ½" or ¾" tapes. According to the producer, this cutter eliminates the need for knives, razors and other such cutters that often cause injury to packagers and packers. Circle No. 12.

Plastic Package Adhesives

Paisley Products, Inc. reports development of nine new liquid adhesives based on synthetic resins, latices, lacquers and other organics. All plastics themselves, these adhesives are specially formulated to provide adhesion of plastic packaging materials. Termed "Pliastics" by the producer, these adhesives are intended for polyethylene, polyester, heavily waxed glassines, as well as other plastic packaging materials, labels and containers of various materials. Circle No. 13.

Bundle Tying Machine

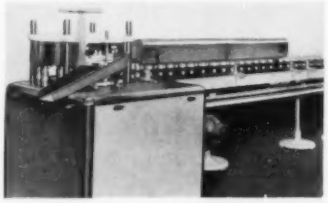
L. F. Fales Machine Co. announces its production of the Ludlow tying machine. It uses a new principle — that of



sealing two ends of twine with a small metal seal, to preserve the full strength of the twine. To insure firmness, bundles or packages being secured are first compressed by a pneumatic device, after which the tying operation takes place. The machine ties bundles up to two feet high and from six inches to three feet wide, and adjusts automatically within these ranges. Circle No. 14.

Bottle filler and heat sealer

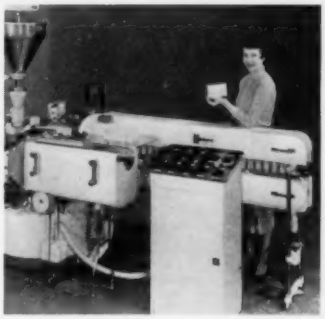
Horix Manufacturing Co. announces its new filler and heat sealer for plastic squeeze bottles. Operating at 180



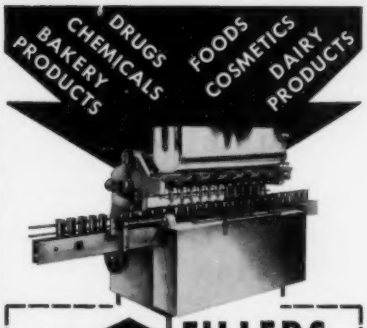
containers a minute this machine gravity fills bottles upside down, then carries them through the heater — to fuse on the bottom piece which an operator drops in place prior to sealing. Sealed, filled bottles eject automatically, passing to a discharge conveyor. Holders adjust to bottle sizes. Circle No. 15.

Automatic Packaging Unit

The Gardner Board and Carton Co. announces the availability of the Swedish "Hermetet" system of packaging, using the "Hermic X" machine to form and close cartons. Various standard fillers may be used in the operation. Special feature of the carton is that the heat-sealed inner liner is an integral part of the carton itself, and may be made of a wide range of materials or laminations. Speeds range up to



50 cartons a minute. According to Gardner the completed packages are air-, sift-, moisture- and odorproof, or greaseproof, depending on the liner used. Circle No. 16.



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80% lighter than glass. Weight savings in shipping alone may pay for entire packaging operation! Less bulk for customers to handle—easy, convenient to use.

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Custom-made to product specifications without premium charges because one-piece, seamless construction eliminates costly cementing and fusing operation.

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Trademarks and messages are multi-color printed right on Lusteroid *permanently*. No labels for you to print or affix. Full range of colors, clear or opaque, matched to *any* specification.

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Please send me: ☐ Samples of Lusteroid vials and tubes.
☐ Your helpful, illustrated booklet "How To Package Small Items".
☐ Container specifications and cost estimate for my product (description enclosed).

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Polyethylene Resin

E. I. du Pont de Nemours & Co. offers a 33-page booklet describing the properties and uses of its "Alathon" polyethylene resin as a coating for flexible materials. It reviews methods of application, typical laminations, and test methods, such as to determine grease resistance. Illustrations include charts of test results. Circle No. 101.

Fabricating, Beading Machine

Taber Instrument Corp. has an illustrated folder reviewing its plastic cylinder fabricator and automatic cylinder beader. It includes a series of step-by-step explanations (with halftones) of how to make transparent cylinders with beaded ends. Specifications and part details are enumerated. Circle No. 102.

Packaging Papers

Orchard Paper Co. announces its group of catalog covering its 1956 line of matched packaging and wrapping papers. Features of these papers include unusual background designs, a large array of base colors and a wide range of color combinations, according to Orchard. Circle No. 103.

Application Roll Data

Alclyde Engraving Co. has a new booklet of reference data, entitled "Engraved Application Rolls". It contains such information as pounds of dry solids applied per 100,000 square feet in various cell depths for offset, gravure or helix groove application methods. Illustrations include those of basic application methods and enlarged views of details. Circle No. 104.

Rubberized Curled Hair Details

Armour Curled Hair Division offers an illustrated booklet telling how to package for protection of items such as delicate instruments. It includes illustrations of scientific package engineering and testing, shows specimen applications, and has drawings and descriptions of product properties. Circle No. 105.

Low Weight Polyethylene

Semet-Solvay Div., Allied Chemical & Dye Corp. has Bulletin No. 116, a 14-page brochure reviewing details of its "A-C Polyethylenes", low molecular weight polymers. It reviews properties, end uses, resistance to chemicals and compatibility with other materials, and includes an index of manufacturers. Circle No. 106.

Case Packing Machinery

C. Tennant, Sons & Co. offers descriptive literature on the British-made Barraclough case packing machinery, including halftones and line drawings illustrating machinery details. Basic specifications and operating procedures also are described. Circle No. 107.

Can Filling Control

Crown Cork & Seal Co., Inc. has a folder covering basic details of its new temperature-sensitive can filling control, to provide precision filling of cans by continuously correcting the amount of contents being filled. This folder includes a chart of losses due to temperature changes at various operating speeds. Circle No. 108.

Polyethylene Film

Plastics Div. of Monsanto Chemical Co. offers a market study on polyethylene film in the flexible packaging field. It reviews the development and specific use of polyethylene and makes comparisons with other materials. Tables include a list of suggested stock sizes of bags, promulgated by National Flexible Packaging Association. Circle No. 109.

Corrugated Containers

Gaylord Container Corp. announces a four-page brochure reviewing six case histories of benefits and savings resulting from use of its "Drumpak" containers. Enumerating Case Histories No. 61 through 66, this illustrated folder describes applications ranging from chemical products to appliances. Circle No. 110.

Bottling Equipment

U. S. Bottlers Machinery Co. reports three new bulletins: One, B-49, reviews semi-automatic multiple liquid fillers, for liquids, semi-liquids and hypochlorites. Other bulletins review hand filling equipment and hand washing machinery. Circle No. 111.

Vacuum Contour Packaging

Pyroxylin Products, Inc. has a bulletin that discusses the use of heat sealing adhesives for preformed plastic blisters and vacuum contoured plastic. It reviews the advantages of heat sealing and compares it to other attachment methods used with "blister" and "skin" packaging. Circle No. 112.

Absorption Tester

Hillside Laboratory offers Catalog No. 2, a four-page folder reviewing its Vanceometer absorption tester. Illustrations of use and test charts accompany the description of how this equipment works in the photoelectric testing of paper and board, through measurement of oil penetration. Circle No. 113.

Black Polyethylene Paper

Thilmany Pulp and Paper Co. announces a brochure describing a new protective specialty paper using black polyethylene laminated to kraft, with the black material used as a barrier against light. Illustrations show specific appli-

cations and describe the use of the new product. Circle No. 114.

Flexible Packaging

Dobeckmun Co. announces a new set of samples, representing specimen packages using its "Metalam", "Durafilm" and paper specialties. These include 16 different consumer packages. Circle No. 115.

Automatic Bale Sealer

J. L. Ferguson Co. has a new four-page brochure describing its fully automatic bale sealer. It outlines pictorially the operation of this machine and sets forth technical data, including specifications, regarding its structural and functional features. Circle No. 116.

Imprinting Equipment

A. Kimball Co. offers a folder describing its new "Roto Kimco" imprinting system for the marking of printed labels and tags with specific data. This folder enumerates product specifications and illustrates typical applications, showing specimen packages, labels and tags. Circle No. 117.

Portable Capping Machine

The Kinex Co. has a folder describing the features and advantages of its new capping machine, designed for portable operation at speeds up to a 100 containers a minute. Circle No. 118.

Packaging Machinery

Wright Machinery Co. announces a catalog of its line of packaging machinery. Illustrations include machine close-ups and actual installations. Equipment specifications are enumerated. Examples show packaging with a wide range of containers, flexible and rigid materials. Circle No. 119.

Glass-Reinforced Paper

Angier Corp. offers a folder describing its "Glass-wrap" blown glass-reinforced paper designed to resist tear in all directions. Specifications of the various types of this material are enumerated, and illustrations show typical packaging and protective applications. Circle No. 120.

Shipping Containers

Chicago Mill and Lumber Co. has a new catalog of its line of shipping containers. This illustrates and describes the containers using plywood, craveneer, corrugated, veneer or sawed materials in cleated, hinged, nailed and wirebound designs. Circle No. 121.

Inert Releasing Agent

Potdevin Machine Co. offers a brochure describing its "Release-Cote" inert releasing agent, used to prevent build-ups of glues, inks, plastics and the like. Illustrations show typical applications and methods of use. Circle No. 122.

High Speed Indexing

Ferguson Machine & Tool Co., Inc. announces Catalog No. 106, covering its high speed indexing units and mechanisms. This catalog includes detailed engineering and mathematical treatment of calculation of load requirements and enumerates selection data for stock and standard drives. Circle No. 123.

Automatic Capping Machinery

Consolidated Packaging Machinery Corp. has a folder setting forth specifications and details of eight standard models of its machinery. Illustrations include line drawings of equipment and halftones of in-plant installations. Circle No. 124.

Package For Liquids

Chase Bag Co. offers an illustrated brochure describing its new "Liqui-pak" container (polyethylene liner in a corrugated box) developed in cooperation with Lawrence Paper Co. and Container Corp. of America. Illustrations and descriptive text review step-by-step in-plant usage as well as close-up details of this new package for bulk liquids. Circle No. 125.

Expandable Polystyrene

Koppers Co., Inc. offers a twelve-page illustrated "idea" book reviewing details and applications of its "Dylite" expandable polystyrene, with emphasis on products utilizing this material. Circle No. 126.

Applicator Roll Guide

Modern Engraving & Machine Co. announces a guide for determining the amount of dry solids in solution (color, plastic or adhesive) which may be applied by its various types and depths of applicator rolls. Printed on card stock and laminated with clear acetate, this guide serves as a ready reference table. Circle No. 127.

Plastic Closures

Scott Plastics has a folder illustrating and describing its stock and custom closures of plastic. It shows products using these as well as illustrations of Scott in-plant operations. Product features are enumerated. Circle No. 128.

Automatic Capping Machine

Arenco Machine Co., Inc. offers a brochure on the Danish-built Schubert "Capsolut" Model A-3 automatic capping machine. Line drawings and halftones illustrate machine features. Text includes specifications and operating details. Circle No. 129.

Packaging Machinery

F. B. Redington Co. announces a new edition of its catalog of automatic machines for cartoning, wrapping and special packaging. Containing 40 pages, this illustrated catalog shows machine details and new developments and adaptations of Redington equipment. Circle No. 130.

C-Flute Corrugated Board

Inland Container Corp. has a four-page folder describing the engineered design characteristics of its C-flute corrugation, explaining with examples its features and advantages. Circle No. 131.

Packaging Machinery

Geveke & Co., Inc. offers a folder describing the German-made Hesser line of automatic packaging machinery for food products. It includes illustrations and details of the different machines as well as packages handled on each. Circle No. 132.

Slitter-Rewinder

The Black-Clawson, Dilts Div., announces Specification Sheet 106, covering the new Dilts slitter-rewinder No. TD-6. Features of the equipment are enumerated, accompanying a drawing of the machine. Circle No. 133.

Plasticizers

Chas. Pfizer & Co., Inc. offers Technical Bulletin No. 31, covering its "Citroflex" plasticizers, a series of citric esters. It reviews their physical properties, specications and compatibility, and discusses some of their applications, such as for plastic packaging for foods. Circle No. 134.

Prefabricated Wrap

United States Printing & Lithograph Co. offers a specimen of its "U. S. Pre-Wrap", a new prefabricated wrapper for in-plant and in-store packaging, which prior to use is in collapsible form — with one unsealed end, provided with a self-sealing adhesive. Circle No. 135.

Bag Packaging Machinery

Walter J. Reynolds Co. has a folder

describing its "Wey-Mor" packaging machine and its rotary bag turret. Features and operating details are described and the different models are illustrated. Circle No. 136.

Combination Metal-Paper Cans

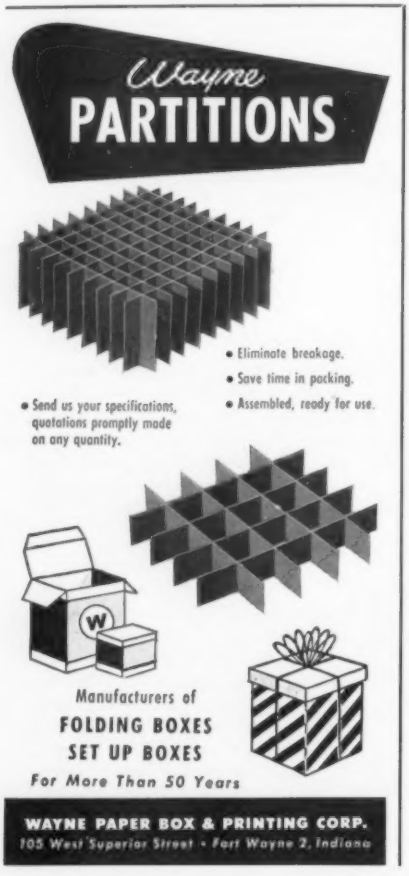
The Cleveland Container Co. offers a four-page folder illustrating and describing its line of combination metal and paper cans, and cores and tubes. Line drawings show the structural features of each type enumerated in the text. Circle No. 137.

Carton Set-Up Unit

E. L. Bivans, Inc. has a four-page folder reviewing the features and details of the "Tuck-O-Mat" Model 50 and "Convey-O-Mat" Model 54, equipment for setting up folding cartons. Machine specifications and details of cartons handled are reviewed. Circle No. 138.

Conveyors

Doughboy Industries, Inc. has a new folder illustrating and describing its single-, double-, and triple-belt conveyors. Halftones of the equipment in use and line drawings of details supplement the descriptive text and specifications. Circle No. 139.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QM Institute Offers Vacuum Requirements Report

Quartermaster Food and Container Institute for the Armed Forces offers a copy of the proceedings of a symposium entitled, "Vacuum Requirements for Canned Tomatoes", a 64-page book discussing vacuum requirements, relationship of vacuum to shelf life, the importance of vacuum and procurement and storage aspects of the problem. The conference reported in this book was arranged and conducted by the National Research Council committee on containers and the subcommittee on fruits and vegetables of the committee on foods. Participants included specialists from industry as well as from government. Copies of the book are available without charge from the QM Food and Container Institute, 1819 West Pershing Road, Chicago 9, Illinois.

Extruded Polyethylene Containers

(Continued from Page 17)

18 oz. Both 11 and 22-station models have the same adjustable nozzle-dive of from one to six inches.

Heat is supplied by two parallel electrically heated Calrods, curved to the path of the moving tubes, operating at about 1300 degrees F, and utilizing about 30 watts per lineal inch of rod. Line voltage is about 115 volts in parallel circuits and 220 volts in series circuits. Above the heaters is a curved reflector-shield made of aluminized steel which conserves heat and directs it at the work to be accomplished.

Water-cooled crimping jaws, located about 1/64 to 1/32 inch above the clamping jaws, press the molten bead to complete the seal. Then the tube passes the cooling stations where small jets of 30 psi air are blown on the newly formed seals to stabilize them. Tubes are then automatically ejected onto an inspection belt or into a receptacle.

Kalix-Dupuy Machine

The Kalix-Dupuy machine, of European make, imported by Haring Equipment Corporation, is a machine I have not yet seen. From the literature on it, it is a 16-station rotary, operating intermittently with a Geneva motion, and uses radiant heat. One user says it is preferred for semi-fluids such as ointments rather than for liquids.

Tubes from 11 to 35 mm diameter x 2¼ to 7¼-inch length are accommodated. Rated production speeds are given below:

11 mm standard wall	38	per minute
11 mm heavy wall	34	" "
35 mm standard wall	28	" "
35 mm heavy wall	24	" "
35 mm extra heavy wall	20	" "

Pharmaceutical manufacturers or others who need to code every tube can do so by engraving the code symbols on one of the crimping jaws. This makes raised figures on the sealed surface of the tube—a method that, on some occasions, is much more economical than interchanging printing plates, or encircling the tube with a band carrying the code.

(Part II of this article will appear on our next issue.)

CLASSIFIED ADVERTISING

Our classified advertising section is intended for use by those wishing to buy or sell used packaging equipment, to employ packaging personnel, seek such employment, offer or seek business opportunities. It is not available for general advertising. Terms: Cash with order. Rates: Up to 60 words, $10.00. If boxed, $20.00. Up to 120 words, $20.00. If boxed, $40.00. Up to 180 words, $30.00. If boxed, $60.00.

Circulation this issue in excess of 35,000

Plastic Scrap Wanted — We need Polyethylene film and chunk scrap for our own production. Please let us know what you have to offer. Prompt quotations given. Address: Erie Plastics Company, 1059 Buffalo Road, Dept. PT, Erie, Pennsylvania.

Sales Representatives — Manufacturers' Agents — Several choice territories still open with AAA-1 Plastic Company starting extruding and converting poly film; extrusion coating poly on Cellophane, Mylar, Foil, Pouch Papers. Rolls, sheets, bags, pouches, 6-color printing.

Openings also for Sales Promotion Assistant and sales correspondents. Replies confidential. Address: Amos Packaging Division of Amos-Thompson Corporation, Edinburg, Indiana.

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Frequently, companies want reprints in quantities, such as for packaging management discussions or in-plant training programs. Our business office will gladly quote you reprint prices for any quantity you want.

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Triangle Elec-Tri-Pak net weigher and filler is the most versatile machine you can buy—

Some processors handle as many as 50 to 60 different products with a single Triangle Elec-Tri-Pak one-operator machine. Weights and packages are different, too.

They get high accuracy, speeds from 12 to 30 packages per minute and low labor cost. The machine investment is moderate.

Here is a combination of advantages not available anywhere else! This may be the cost-cutting answer to many of your packaging jobs. Write today for FREE Bulletin describing Elec-Tri-Pak weighers.

TRIANGLE PACKAGE MACHINERY CO.
6631 West Diversey Avenue
Chicago 35, Illinois

What we think

Developments in the materials, machines and methods of packaging are taking place so rapidly that it looks like the technology of our field is running away from the men trying to manage it. In other words, the human side of our work is lagging behind. This condition also exists in other fields of business and industry, but because of the accelerated postwar growth of packaging the problem here is particularly acute.

A quick glance at the situation may suggest that all we need is a *general* improvement in the technique of managing the packaging function. Obviously, this in itself is a worthwhile objective. But a moment's reflection pinpoints the heart of the difficulty: A need for better handling of the human relationships — such as in selling one's ideas to those above and below, as well as those in parallel capacities.

This leads us to conclude that one mark of the successful packaging executive is his ability to sell his program to the rest of his company. This is unquestionably an attribute of those generally recognized as leaders in the management of the packaging function. One of these men once told us that he was spending 50 to 75 per cent of his time selling his program to other people, leaving just 25 to 50 per cent for the operational job.

The Meaning Of It All

But we think there is more than salesmanship involved. While the successful consummation of short and long range programs depends on the skill of their sponsors in winning the support of management, the cooperation of other departments and the help of the folks on the packaging lines, this skill deserves a closer scrutiny.

The big point is that the successful managers of packaging are able to inspire this confidence and enthusiasm because they have crystalized in their own thinking a sense of purpose, direction and satisfaction in their work. And because they recognize the importance of this for themselves, they keenly appreciate the need of imparting these values to others.

In other words, they rely on intangible, moral values to sell their programs, make a corresponding appeal to their peers and their subordinates, and generate an *esprit de corps* on behalf of their work. They get results because their approach encourages the fullest development of those working for them and with them.

Seeking New Standards

Packaging seems to be experiencing the same general unsettling of established ideas, the same searching for new ways that pervades other specialized functions throughout industry. Thoughtful businessmen, seeing the familiar landmarks fade away, are searching for new guideposts.

Unfortunately, a lot of people are getting hurt in the resultant shuffling-around. Men nationally known as effective executives in their respective companies sometimes lose sight of the human values. We know of one packaging man who was summarily fired just before Christmas. While he was picked up by another company in the same field, the impact of the whole thing left deep scars. In another case, a number of men engaged in a function closely connected with technical packaging development were abruptly dropped, apparently because the management of their organization simply decided to do away with the particular function.

We have only one side of the story in each case, and hesitate to pass judgment on the merits of the firings without hearing from the respective vice presidents who manned the guillotines. But we do quarrel with the methods; in the latter case some of the men were of long service and approaching retirement. Assuming (but not deciding) that the separations rested on sound reasons, we would think it all could have been accomplished in a more humanitarian way.

Getting back to those charged with putting over a program, we know that some are merely empire builders and others trade on the dubious practice of creating divided allegiances. Further, we have those who promise bonuses, promotions and facilities — simply to win support for a project, and with no real intention of delivering on the promises.

But to take a look at the fellow who successfully sells a packaging program on a long term basis, the real basis of it all seems to be this: His salesmanship is not opportunistic, but is based on his recognition of fundamental Christian values and the innate dignity and worth of individuals. He knows that money is not the paramount motivation for an executive or a technician or a worker, notwithstanding considerable vocal evidence to the contrary.

That Elusive "Plus" Value

All this emphasizes the plus value that distinguishes the real leader from others holding similar jobs. First, he has sound technical competence; this is prerequisite. Second, he has a good working knowledge of structural and functional organization and grasps what goes on in the company outside his own department. Third, he has skilled himself in the communicative and manipulative processes. But fourth, and most important, he has the vital spark of inspiration, based on his analysis of his purposes and needs, and his recognition of these in the other people with whom he works.

Whether a company is large or small, multi-plant or single factory, the problems are the same. Throughout all of these, too many packaging men and their superiors have the first three — but not the fourth. We hope they acquire it and develop it.

Bruce Hollingren

Editor

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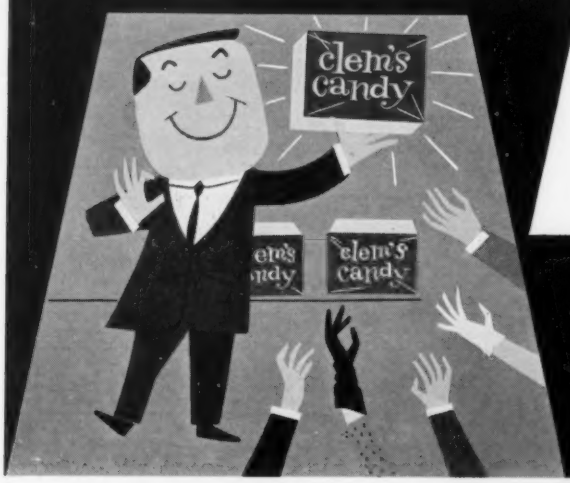

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To satisfy the steadily increasing demand for Wildroot products, three Jones Fully Automatic Cartoners were selected for Wildroot's high speed lines. Each cartoner handles six sizes of bottles and cartons, plus leaflet, at speeds up to 160 per minute. Wide range and flexibility provide the invaluable assurance that new sizes and new products can be added at any time.

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